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September 1997

FINAL
Greybull Valley Dam and Reservoir Environmental Impact Statement

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WYW-131027

September, 1997

Dear Reader:

This abbreviated Final Environmental Impact Statement (FEIS) on the Greybull Valley Irrigation District Dam and Reservoir Project is provided for your information and use. The proposed dam and reservoir project is a 150-foot high zone-earth embankment dam and a 33,470-acre-foot impoundment in an unnamed drainage west of Roach Gulch which is south of the Greybull River. This FEIS is a supplement to the Draft Environmental Statement (DEIS) published in December, 1996. The FEIS contains comments received on the DEIS and responses to those comments. It incorporates by reference the material presented in the DEIS and identifies changes to the DEIS as a result of additional information and public comments received after the DEIS was published.

There will be a 30-day public comment period on the FEIS. The comment period will start on the day the Environmental Protection Agency published the FEIS Notice of Availability in the Federal Register. Persons who wish to comment on the FEIS or express concerns they believe should be considered in the decision should send their comments in writing to: **Bureau of Land Management, Attn: Don Ogaard, Project Manager, Worland District Office, 101 S. 23rd St., P.O. Box 119, Worland, WY 82401; FAX (307) 347-6195**. Comments received during this period will be considered in the decision making process.

Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours 7:30 a.m. to 4:30 p.m. Monday through Friday. Individual respondents may request confidentiality. If you wish to withhold your name or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials or organizations or businesses, will be made available for public inspection in their entirety.

This FEIS is not a decision document. Upon expiration of the 30-day comment period, the BLM and Army Corps of Engineers will analyze the comments received, prepare Records of Decision (ROD), and make the RODs available to the public.

Please keep this volume of the FEIS for future reference. A copy of the FEIS has been sent to the affected Government agencies and to those who provided comments on the DEIS or otherwise indicated that they wished to receive a copy of the FEIS.

The BLM and Corps would like to thank the individuals and organizations who provided suggestions and comments on the DEIS. Their help has been invaluable in preparing this FEIS.

Sincerely,

Alan R. Pierson
Wyoming State Director
Bureau of Land Management

Candace M. Thomas, Chief
Environmental Analysis Branch,
Planning Division
Army Corps of Engineers, Omaha Dist.

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FINAL

ENVIRONMENTAL IMPACT STATEMENT
for the
GREYBULL VALLEY DAM AND RESERVOIR PROJECT
in
PARK COUNTY, WYOMING

Bighorn Basin Resource Area
Worland District, Wyoming

Prepared for:

U.S. Department of the Interior
Bureau of Land Management
Worland, Wyoming

U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

Prepared by:

Western EcoSystems Technology, Inc.
Third Party Contractor
Cheyenne, Wyoming

1997

Alan R. Pierson
Wyoming State Director
Bureau of Land Management
U.S. Department of the Interior

8/1/97
Date

Candace M. Thomas, Chief
Environmental Analysis Branch
Planning Division
U.S. Army Corps of Engineers

8/04/97
Date

GREYBULL VALLEY DAM AND RESERVOIR
FINAL ENVIRONMENTAL IMPACT STATEMENT

September 1997

Co-Lead Agencies:

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Bureau of Land management, Worland District Office
Worland, Wyoming

and

U.S. Department of the Army
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ABSTRACT -- The Greybull Valley Irrigation District proposes to construct an off-channel dam and reservoir to supply irrigation water to farmers in the lower Greybull River Valley. Three alternatives were evaluated: the proposal (Lower Roach Gulch Reservoir), the Blackstone Gulch Reservoir and the No Action Alternative. The Environmental Impact Statement discloses potential environmental impacts from implementation of the alternatives. The Draft Environmental Impact Statement (DEIS) was made available to the public in January, 1997 with a 60 day comment period ending on March 18, 1997.

The Final Environmental Impact Statement (FEIS) supplements the DEIS by providing additional information, changes and corrections to the DEIS, comment letters received, and responses of the BLM and Corps to the comments received. Together the DEIS and FEIS analyze the affected environment, potential environmental consequences, and proposed mitigation for the proposal and alternatives considered.

There will be a 30 day public comment period on the FEIS. A complete copy of the FEIS can be obtained from the Worland District Office of the Bureau of Land Management. Following the 30 day comment period, the BLM and Corps will analyze the comments received and prepare Records of Decision (ROD). Comments on the FEIS should be sent to Don Ogaard by **October 19, 1997** at the above address.

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CHAPTER 1.0 INTRODUCTION

The Greybull Valley Irrigation District (GVID) proposes construction of an off-channel dam and reservoir in Park County, Wyoming to supply irrigation water to farmers in the lower Greybull River Valley. The GVID has applied to the U.S. Army Corps of Engineers (Corps) for a permit, pursuant to Section 404 of the Clean Water Act, to discharge dredge or fill material into the waters of the U.S. The GVID has also submitted a right-of-way (ROW) application for the project to the United States Department of Interior, Bureau of Land Management (BLM) pursuant to Section 5 of the Federal Land Policy and Management Act (1976) and implementing regulations 43 CFR, part 2800.

GVID's proposal includes an earthen dam at the lower end of an unnamed gulch (ephemeral tributary of the Greybull River) immediately west of Roach Gulch. Water for the reservoir would be diverted from the Greybull River and delivered to the reservoir via a 5-mile-long canal. Water would be released from the dam back to the Greybull River through an existing channel. The proposed reservoir would store approximately 33,470 acre-feet (AF), and inundate approximately 700 acres.

The BLM and Corps determined that an analysis of the environmental effects of the project and reasonable alternatives was necessary to aid in decision making. A Draft Environmental Impact Statement (DEIS) was prepared and made available to the public in January, 1997. A 60 day comment followed availability of the DEIS and ended on March 18, 1997. A public meeting for the DEIS was held in Emblem, Wyoming on January 29, 1997. This Final Environmental Impact Statement (FEIS) was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) as amended and together with the DEIS provides a complete and objective analysis of environmental effects.

The purpose of the FEIS is to supplement the DEIS providing additional information, changes and corrections to the DEIS, comment letters received, and responses of the BLM and Corps to comments. Together, the FEIS and DEIS analyze the affected environment, potential environmental consequences from project implementation, and proposed mitigation for the Greybull Valley Dam and Reservoir project.

The FEIS is organized in three chapters. Chapter 1 is an introduction and explanation of the FEIS. Chapter 2 includes errata and changes made necessary by the review of the DEIS. Changes to the DEIS were developed in response to comments made about the proposed project. Chapter 3 presents all the comment letters received and responses of the BLM and Corps to the comments.

New appendices not found in the DEIS are provided with information supporting response to some of the more detailed comments. Appendix E contains a copy of the agreement between the Wyoming Water Development Commission, Greybull Valley Irrigation District, and the Wyoming Game and Fish Department regarding fisheries, public access, and bypass river flows. Appendix F contains a report of results of a pilot study conducted in the spring of 1997 to investigate the potential for selenium concentrations to reach levels in the reservoir posing a risk to wildlife and fish. Appendix G presents results of additional socioeconomic analyses conducted in response to certain comments received.

During the review period comments were received about a variety of issues. Letters were also received expressing support for the project and suggesting that project development proceed with out delay. Several issues were raised by more than one reviewer. Major issues raised in the comment letters include:

- the reclamation process and the species of plants that would be used;
- wetland impacts and mitigation that will occur;
- the impact of the project on water quality in the Greybull River and the analyses that had been conducted to address this issue;
- the potential for dam failure and clarification of the resulting impacts;
- senior water rights and the effect of the project on the Yellowstone River Compact;
- the potential for a public fishery to be established in the reservoir;
- the resulting changes in agriculture practices in the valley such as the increase in sugar beet production and the consequences of this change;
- the potential for increased erosion along the Greybull River;
- effects of the project on County services and permitting processes including the increased demand for law enforcement;
- economic impacts from the project;
- cumulative impacts;
- the NEPA process; and
- the potential for selenium to accumulate in the reservoir.

The potential for selenium levels to accumulate in the reservoir was raised by several reviewers. As a result of this concern, a study was undertaken to investigate selenium levels in the Greybull River water and sediment at the location of the diversion dam and in water and sediment from existing man made ponds located at the two reservoir alternative sites. Methods and results of this study are present in Appendix F.

Individual concerns and issues raised are identified in each of the letters received about the project in Chapter 3. The response of the BLM and Corps to these comments are provided adjacent to the comments.

CHAPTER 2.0 ADDITIONS AND ERRATA

Revisions and changes to the DEIS have been made based on agency reviews and comments received during the comment period. Changes and additions to the DEIS are listed by page, paragraph, and line number.

2.1 ADDITIONS AND CORRECTIONS

Page Number Paragraph Line Number	Text in DEIS	Text Changes
x Figure IV	The figure identifies landownership of T. 51 N., R. 98 W., sec. 36 as BLM property	Section 36 is State Trust Land.
1 - 12 Table 1.4	OK.	The following permits have been added to the list of permits likely needed for Construction of the Greybull Dam and Reservoir: Wyoming State Land Easement Park County Floodplain Development Permit Park County Land Use Certificate Park County ROW Permits for access
2 - 10 Table 2.3	The table has the environmental screening criteria for the Conservation and Groundwater alternatives reversed.	The table should identify the environmental screening criteria as "no" for the Conservation Alternative and "uncertain" for the Groundwater Alternative.
2 - 3 Figure 2.3	The figure identifies landownership of T. 51 N., R. 98 W., sec. 36 as BLM property	The property in question is State Trust Land.
3 - 12 Table 3.2	The first entry for iron is unlabeled.	The data in the table was taken from the EPA STORET database (EPA 1995). The entry in the STORET database was also unlabeled. The entry should have been identified as unknown and footnoted to indicate that it was unlabeled in the original source.
3 - 13 Table 3.2	The WDEQ Human Health Standard for nitrate is identified as 10,000.	The WDEQ Human Health Standard for nitrate should be 10 mg/L.
3 - 13 Table 3.2	OK.	The parameter name for Sodium is expanded to: "Sodium, % of Dissolved Cations".

Page Number Paragraph Line Number	Text in DEIS	Text Changes
3 - 14 3 7	OK.	The following new paragraph is added after paragraph 3: Manganese was measured once at a level of 100 *ug*/L which exceeds the WDEQ Human Standard of 50. Only one measurement has been reported by the USGS for a sample taken in December of 1965 at the Greybull River near Basin station (EPA 1995). Streamflow was measured at 150 cfs at the time of the sample collection. It is difficult to reach any conclusions from a single measurement. Manganese levels in the Greybull River may have been high during the measurement period, the measurement could have been an aberrant reading resulting from an unusual incident in the basin above the gage, or a laboratory error could have occurred resulting in a high reading.
3 - 28 2 1	The portion of the Greybull River below the confluence with the Wood River has been designated as a Class 2 fishery, ... (WGFD 1987).	The portion of the Greybull River below the confluence with the Wood River has been designated a Class 2 surface water, ... (WDEQ 1990)
3 - 29 1 2	... as particularly degraded habitat for fisheries and other aquatic life,...	... as particularly degraded habitat for cold water fisheries, ...
3 - 53 1 4	... a lower net return ($27.88.acre)...	... a lower net return ($34.18)...
3 - 53 2 4	... an average return to farmers of $36.41 per acre-foot...	...an average return to farmers of $37.76 per acre-foot...
3 - 54 Table 3.9	column 7, row 3 reports $ 111.53 column 8, row 3 reports $ 27.88 column 8, row 6 reports $ 159.20	The correct figures are $ 136.71, $ 34.18, and $ 165.50 respectively.
3 - 57 new section	OK.	The following section has been added: 3.8.4.6 Solid Waste Disposal The proposed reservoir sites are located in Park County. Solid waste from the project area is generally disposed of at the Cody landfill via the Park County waste disposal system. The nearest approved facility for hazardous waste from the project area is the Worland landfill.
4 - 2 Table 4.1	OK.	Table 4.1 has been revised to indicate which effects require mitigation (see Table 4.1, page 2-16 of the FEIS).

Page Number Paragraph Line Number	Text in DEIS	Text Changes
4 - 18 after 1	OK.	The following text has been added to Section 4.3.1.3 River System Depletions. Daily streamflow data required for preparing flow duration curves are available for only one location along the lower reaches of the Greybull River (Greybull River near Basin station). Data were collected at this station from 1931 through 1973 when the station was discontinued. Figure 2-2 shows flow duration curves prepared from the available data for this station. Flow duration curves were prepared for the period before completion of Upper Sunshine Reservoir in 1939, the period when Upper Sunshine was in operation and before Lower Sunshine Reservoir was completed (1939-1971), the period when both upper basin reservoirs were in operation (1971 to present), and an estimated flow duration curve prepared from modeling data for future conditions with Lower Roach Gulch Reservoir in operation. Data for the periods before completion of Upper Sunshine Reservoir and after completion of Lower Sunshine Reservoir are limited, but are presented for comparison purposes. The available data suggests that flows in the low flow portion of the hydrograph increase with the addition of each new reservoir to the system with the exception of Lower Roach Gulch. This is due to the increased availability of late season irrigation water with additional reservoir storage. Additional late season irrigation increases return flows in the low flow months of late fall and early winter and thus increases streamflow in the Greybull River in the lower valley during these months. Lower Roach Gulch Reservoir does not appear to result in additional low flows for two reasons. First, it is difficult to predict effects on low daily flows using data from a monthly operations model, particularly when low flows fluctuate significantly on a daily basis. If the model shows reservoir diversions during a low flow month, it is difficult to allocate these diversions to a particular day or group of days because of the flow travel time between the reservoir diversion points and the lower valley station. Second, addition of Lower Roach Gulch Reservoir to the system does not provide proportionately as much additional water for late season irrigation as addition of the other reservoirs did. The benefits of Lower Roach Gulch Reservoir are primarily in more efficient operation of the system rather than in provision of additional water supply.

Page Number Paragraph Line Number	Text in DEIS	Text Changes

Figures 2-3 to 2-18 show monthly streamflow obtained from the WEST model of the Greybull River Valley for both present and future conditions (with Lower Roach Gulch Reservoir) at four locations in the Greybull River Valley. Graphs of monthly streamflow are presented for the period of record of the model, a typical dry year, and a typical wet year for the Greybull River at Meeteetse, above the Lower Roach Gulch diversion, above the Bench and Farmer's canal diversion, and at the river mouth. In general, the model indicates slightly more streamflow at all locations during low flow months with the exception of the month of April. April flows tend to be lower in the lower valley because Lower Roach Gulch is able to divert some flows to the reservoir that are currently bypassed at the upper reservoirs due to canal icing. Streamflows in the lower valley tend to be significantly greater during dry years with the addition of a lower basin reservoir because additional storage is available to supplement natural flows.

Graphs of wet and dry year flows above the Bench and Farmers canal diversion illustrate that the low flow months are typically from November through April. The instream flow bypass of 50 cfs or natural flow, whichever is less, at the Lower Roach Gulch diversion passes through this reach with no losses to diversions because the low flow months coincide with the months outside the irrigation season. None of the diversions in this reach are active during the low flow months.

The total proposed additional reservoir storage capacity is 30,000 acre-feet. The yield of the proposed reservoir, based on estimated demands obtained from the GVID and WEST team modeling, averages approximately 21,500 acre-feet per year. This yield is partially obtained by conserving water in the upper valley reservoirs for use in dry years and, as a result, decreases the average yield of the upper valley reservoirs. Total irrigation diversions in the valley increase by approximately 9,800 acre-feet per year as a result of the project which is approximately equal to the average future need identified in Chapter 1. Streamflow in the Greybull River is depleted by an average of 5,480 acre-feet per year and streamflow in Dry Creek is augmented by an average of 2,120 acre-feet per year resulting in a total project depletion to the Bighorn River of approximately 3,360 acre-feet per year. This depletion represents an average efficiency of approximately 34 percent. Irrigation efficiency varies by season and crop type. Most of the supplemental water from the project is proposed for early spring irrigation of beets, a period and crop with relatively low efficiency. Based on historical diversion patterns irrigation efficiencies range from 27-70 percent. Spring and fall irrigation efficiencies average approximately 30 percent.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		Streamflow in the Greybull River is augmented during dry years as a result of the project due to the availability of stored water from previous years to supplement natural streamflows (Figures 2-3 to 2-18). Streamflow during wet years tends to be slightly less due to increased storage capacity although the change is small because of the small change in water use during wet years.
4 - 19 4	OK.	The following sentences are added to paragraph 4: Figure 2-21 depicts the estimated floodplain boundaries for the Greybull River valley downstream of Lower Roach Gulch Reservoir after a dam break at the reservoir. The effects of a dam failure during high flow in the Greybull River are inconsequential; however, a "Blue Sky" dam break (Figure 2-21) would cause substantial flooding of the valley downstream of the reservoir and in the town of Greybull.
4 - 19 after 4	OK.	The following text has been added to Section 4.3.1.5 Dam Failure and Flooding at the Diversion Dam: The risk of a dam failure has been estimated by using failure rates for other dams in the United States. For this project, a relatively large dam, the risk of dam failure estimated using this method is approximately 1 in 1,000 for the first five years after construction and then drops to 5 in 100,000 for the remainder of the dam life (Goodman 1984). This method of estimating the risk of dam failure has been criticized because it does not adequately account for the differences in dam design and use. All new dams are compared to a "typical" dam which is not defined but is an amalgam of all dams used in the study. To solve this problem, a database of dam performance problems encountered in the United States is being prepared at the Center on the Performance of Dams at Stanford University. The database will contain information on dam failures; dam performance problems; and information such as dam size, method of construction, dam location, and unique characteristics. At this time, the database is not complete and contains information from only a few states and agencies. When complete, it will allow the risk of new dam failure to be estimated by comparing it with other dams with similar characteristics. The WEST team submitted a request to the Center for information on failures of dams with characteristics similar to the Lower Roach Gulch Dam. The database and literature search conducted by the Center found five dam failures involving dams of similar size and capacity to Lower Roach Gulch Dam, but only one of the dams was constructed of zoned earth fill. The Center was unable to determine if any of the dams which failed were located off-channel. Because of the lack of information, the WEST team did not attempt to prepare a more rigorous risk analysis of the Lower Roach Gulch Dam.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		The EIS process did not conduct a rigorous engineering analysis for dam safety which is not within the scope of work for the decisions being made by the BLM and Corps. An engineering analysis of dam safety will be conducted on the final design of the dam by the State Engineer following project approval and final project design.
4 - 23 1	OK.	The following text has been added to Section 4.3.2.1 Total Dissolved Solids The potential effects of TDS and its components on aquatic life were estimated based on a computer program (the salinity toxicity relationship, STR, model) developed by the Gas Research Institute (Tietge et al. 1994). This model predicts the effects of seven common ions, Na$^+$, K$^+$, Ca^{++}, Cl$^-$, SO$_4^{--}$, and HCO$_3^-$, to two freshwater cladocera, *Ceriodaphnia dubia* and *Daphnia magna,* and the freshwater minnow, *Pimephales promelas*. The toxicity predictions are based on empirically derived coefficients of toxicity that were developed by multivariate regression on data from over 3,000 toxicity determinations of different ion combinations. The model was run using two different TDS concentrations, 700 mg/L and 1090 mg/L, using ionic concentrations or their proportions for these seven ions listed in Table 3.2. These two TDS concentrations represent the predicted maximum TDS concentration in the Lower Roach Gulch Reservoir and the maximum TDS concentration measured in the Greybull River, respectively. The STR model predicts that exposure to Lower Roach Gulch Reservoir water with 700 mg\L TDS for 48 hours would be lethal to 0.5 percent, 2.3 percent, and 1.2 percent of *C. dubia*, *D. magna*, and *P. promelas*, respectively. Exposure to Greybull River water for 48 hours with 1090 mg/L TDS would be lethal to 2.9 percent, 4.3 percent, and 2.1 percent, respectively, of these three species. Although the test species these predictions are based upon probably would not be present in the reservoir or river, it is likely that species as sensitive as them could potentially be present. Therefore, these concentrations of TDS potentially could create low levels of acute stress to sensitive species. Potential chronic effects of TDS are unknown, but probably are greater than those predicted by the STR model. Therefore, it is possible that existing TDS levels in the Greybull River are stressful to some aquatic species and may be influencing the types of species that are found in the river. The species that are present in the river, however, probably are adapted to the TDS levels that are now present. Since the maximum TDS levels predicted in Lower Roach Gulch Reservoir (700 mg/L) are nearly equivalent to the mean TDS levels in the river (660 mg/L), the incremental effects of TDS from the reservoir on the aquatic species that presently inhabit the river should be negligible.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
4 - 28 5	OK.	The following text has been added to Section 4.3.4 WATER RIGHTS

Other downstream water users consist of owners of ditches and canals downstream of the reservoir. It is not possible to specifically identify these "other" water users until the people who have or will purchase storage in the new reservoir are identified. The same is true for "non-stake holders". Senior water right holders are all current water users downstream of the proposed reservoir on the Greybull River and consist primarily of irrigators with irrigation water rights although there are a few small stock and domestic water rights. Senior water right holders on the Bighorn River were not considered because the available data (WWDC and University of Wyoming 1990) indicates that approximately 1,600,000 acre-feet of water per year remains available to Wyoming water users in the Wind and Bighorn River basins under the Yellowstone River Compact and the project depletions would result in a very small reduction in the available water.

There are unused senior water rights downstream of the project covering approximately 13,300 acres (Wyoming State Board of Control 1988, GEI 1994a). These senior water rights are not in use primarily because of inadequate water supplies. Transfer of these senior rights, although they would probably be available for transfer, would not be of any use in increasing water supplies because, although they are senior to the proposed reservoir, they are not senior enough to have adequate water supplies. Other senior water rights in the basin are currently in use and owners of the water rights are in need of additional supplies from the proposed reservoir. It is unlikely that the water right owners would agree to transfer their senior water rights in return for a share of the water they already have.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
4 - 32 Table 4.4	OK.	The following revised table replaces Table 4.4.

Table 4.4 Comparison of wetland acreage potentially impacted by each of the reservoir alternatives.

Project Component	Lower Roach Gulch	Blackstone Gulch
Reservoir Site	0.36 acres streambed 1.80 acres stockpond	0.04 acres streambed 0.51 acres stockpond
Diversion Canal Route	0.28 acres	0.0 acre
Pool Behind Diversion Dam	1.53 acres	1.45 acres
Return Flow Route	0.91 acres	0.02 acres
Greybull River from Diversion to Return	1.15 acres	1.46 acres
Total	6.03 acres	3.48 acres

Page Number Paragraph Line Number	Text in DEIS	Text Changes
4 - 54 4 new section	OK.	The following section is added before Section 4.7.3 LIVESTOCK GRAZING: 4.7.3 EXISTING IRRIGATION SYSTEM The amount of water in bank storage cannot be managed by construction of the project except in a very limited way by managing some of the peak flows in the river. Figure 2-1 shows average monthly flows at the Greybull River at Meeteetse gage obtained from the WEST team model for both present and predicted future conditions. As Figure 2-1 suggests, the amount of water in bank storage and available for riparian vegetation in the reach between the Upper and Lower Sunshine Reservoirs and the proposed project should increase as a result of the project. Average peak flows will increase slightly in this reach because the availability of lower valley storage will reduce demand on the upper valley reservoirs. Upper valley reservoirs will contain more water, on average, than they do under present conditions and will not be able to capture as much of the peak spring flows. As a result, the peak flows passing the upper valley reservoir diversions will increase with project implementation and resulting bank storage will also increase. Peak flows will be slightly lower below the proposed diversion but flows will be higher on average. However, the effects of this dynamic relationship are impossible to model with available data and could only be determined by extensive study following the project construction.
4 - 54 Section 4.7.3	4.7.3 LIVESTOCK GRAZING	The section number is changed to 4.7.4
4 - 58 6 3	... to increase farm income by $36.43...	... to increase farm income by $37.76...
4 - 58 6 4	... farm income by $856,000.	... farm income by $887,000.
4 - 58 6 7	... by approximately 2.1 percent annually.	... by approximately 2.2 percent annually.
4 - 59 1 7	... the annual $856,000 increase...	... the annual $887,000 increase...

Page Number Paragraph Line Number	Text in DEIS	Text Changes
4 - 59 1 8	... result in a $2.0 million...	... result in a $2.1 million...
4 - 59 2 2	... to be approximately $2.9 million annually.	... to be approximately $3.0 million annually.
4 - 62 2 3	The sentence references Table 3.14.	The sentence should reference Table 3.9.
4 - 62 5 5	... which is $36.43 per acre-foot...	... which is $37.76 per acre-foot...
4 - 62 5 8	... would generate $856,000 in ...	... would generate $887,000 in ...
4 - 62 5 9	... or $2.9 million ...	... or $3.0 million ...
4 - 62 5 10	... project life is $62.3 million.	... project life is $64.5 million.
4 - 66 5	OK.	The following text has been added to Section 4.8.4.2 Transportation, Lower Roach Gulch Alternative: Construction traffic will likely utilize existing highways and roads to access the project. Access to the Lower Roach Gulch general project area will be on U.S. Highway 16 and Wyoming Highway 120 to the Burlington-MeeteetseRoad. Traffic for the diversion dam and canal will access the site from the Burlington-Meeteetse Road via Park County Road 3SL and the Sheets Flat bridge (#EHY). A new road will be constructed to the diversion dam starting near the Sheets Flat bridge and following existing two-tracks and ranch access roads. Secondary access to the canal will be via Park County Road 3SL to approximately the mid point of the canal. Traffic to the dam will access the site from the Burlington-Meeteetse Road via Park County Road 3XQ and bridge (#EHZ). A new road will be constructed to the dam site along an existing trail beginning in T. 51 N., R. 98 W., sec. 24.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		The new roads to the diversion dam and reservoir dam will be constructed to allow access in all weather conditions. The roads will have a top width of 12 feet and will consist of an 8 inch subbase of minus 6 inch pit run (pit material less than 6 inches in diameter) topped with 3-4 inches of minus 1.5 inch crushed based (crushed material less than 1.5 inches in diameter). The road along the existing trail to the reservoir dam will cross mixed grassland-sagebrush shrubland. This road will permanently replace approximately 2.54 acres of this habitat. The road to the diversion dam will permanently replace existing roads that provide access to two ranch homes and cross agriculture land used for livestock grazing. Construction traffic will consist primarily of equipment mobilization and transport and personnel access. The majority of earth fill material will be acquired on or adjacent to the major project facilities. Concrete and concrete aggregates will be hauled in from offsite. Some riprap may also be imported from offsite. Hauling routes will be the same as described above with some hauling expected on the YU Bench Road. Routes used by construction workers are not predictable and will be based on where individuals live and personal preference. These routes should be dispersed throughout Big Horn and Park Counties and be incorporated into normal traffic patterns in the area.
4 - 67 1	OK.	The following text has been added to Section 4.8.4.2 Transportation, Blackstone Gulch Alternative: Construction traffic will likely utilize existing highways and roads to access the project. Access to the Blackstone Gulch general project area will be on U.S. Highway 16 and Wyoming Highway 120 to the Burlington-Meeteetse Road. Access to the reservoir dam site will be along a similar route as access to the Lower Roach Gulch diversion dam and canal. Access to the diversion dam will be from the reservoir dam along the west side of the reservoir to the canal at the point where it enters the tunnel. The route will then continue along the canal to the diversion dam. Construction traffic impacts will be similar to the Lower Roach Gulch Alternative. New roads constructed for the Blackstone Gulch Alternative will be similar to the Lower Roach Gulch Alternative. The road to the reservoir dam will replace an existing two-track which crosses agriculture land. The road to the diversion dam will permanently replace approximately 5.09 acres of mixed grassland-sagebrush shrubland habitat on the bench bordering the west side of the reservoir..

Page Number Paragraph Line Number	Text in DEIS	Text Changes
4 - 69 new section	OK.	The following section has been added: 4.8.4.6 Solid Waste Disposal Solid waste generated during project construction will be transported to the Cody landfill by the contractor or via the Park County waste disposal system. Solid waste generated during project operation will be trucked to the Cody landfill by GVID. Hazardous materials anticipated for use on the project are consumables such as fuel (see Section 4.12 HAZARDOUS MATERIAL). No hazardous waste is anticipated as a result of project implementation. Should hazardous waste be generated during project construction it will be transported to the Worland landfill by the contractor. There is no difference between the two reservoir alternatives.
4 - 82 new section	OK.	The following section has been added: **4.16 CUMULATIVE EFFECTS** The NEPA process has not identified any substantial proposed action(s) that may be anticipated to occur in the reasonably foreseeable future within the project area or within the geographic scope of the EIS's resource effects analysis. While day to day human activities in the study area may result in future environmental effects to resources evaluated in this EIS, any attempt to quantify such effects would be speculative and unreliable. Therefore, the cumulative effects analysis primarily includes past actions, current actions, and the proposed action and its alternative. Detailed description of anticipated impacts including cumulative impacts are found in individual sections throughout CHAPTER 4.0. Following is a brief summary of some of the anticipated cumulative impacts from project implementation The GVID currently provides irrigation water to members through the operation of Upper and Lower Sunshine reservoirs. These reservoirs, built in 1939 and 1972 respectively, are off-stream facilities located approximately 35 miles upstream of the Farmers and Bench canal diversions near the confluence of the Wood and Greybull rivers. Upper Sunshine has a storage capacity of approximately 53,000 acre-feet and Lower Sunshine 58,900 acre-feet. There are also several lower Greybull River Valley reservoirs which are privately owned and store water for irrigation purposes. These reservoirs include Wardel Reservoir (560 acre-feet), Harrington Reservoir (1,200 acre-feet), Fairview Extension Reservoir (790 acre-feet), and Gould Reservoir (108 acre-feet). These reservoirs receive water diverted primarily from the Greybull River and runoff from smaller drainages. Another lower valley reservoir, Sandstone Reservoir (670 acre-feet), was abandoned approximately 30 years ago.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		Irrigators in the Greybull River Valley have over 88,000 acres permitted for irrigation (see Figure 1.1 of DEIS), and currently irrigate approximately 65,000 acres. Approximately one-half of the irrigated lands in the GVID (33,500 acres) are served by the Farmers and Bench canals, which divert water from the lower Greybull River southwest of the town of Burlington. Other irrigated lands in the District are served by smaller diversion structures which take water from the upper Greybull River above Meeteetse (5,100 acres), the Wood River (4,600 acres), and the lower Greybull River in the stretch from Meeteetse downstream to Greybull (19,300 acres). No annual inventory is made of the number of acres irrigated within the GVID although the number of irrigated acres apparently varies little from year to year Because construction of the proposed reservoir would result in a more dependable water supply, approximately 15 percent of GVID members indicated that they would irrigate additional acreage under water right but not currently in crop production. This increase in irrigated acreage would result in the conversion to irrigated crop of approximately 1,400 acres not currently irrigated for a total of approximately 66,400 acres irrigated in the valley. The new areas are scattered throughout the Greybull Valley Irrigation District and their exact locations are not known at this time. This additional acreage is probably fallow land (subject to previous tillage) and additional loss of high quality native upland habitats would probably not occur as a result of the project. There would be no increase in acres permitted for irrigation as a result of the project. Based on results of monthly stream flow modeling, irrigation in the Greybull River Valley will result in an annual depletion of approximately 5,480 acre-feet at the mouth of the Greybull River, an increase of approximately2,120 acre-feet at the mouth of Dry Creek, and a net depletion of approximately 3,360 acre-feet in the Bighorn River. Water resource impacts from the project were based on past actions (for example, construction of Upper and Lower Sunshine Reservoirs) and modeling of the proposed project added to the Greybull River system. No future projects have been identified which directly utilize the water resources of the Greybull River in addition to the proposed project. The impacts identified in Section 4.3 WATER RESOURCES are essentially cumulative impacts analyses based on past actions and the proposed action which effected water resources of the Greybull River Valley. Additional dust from increased agricultural activity, travel on dirt roads, and recreational access to the reservoir will add to the ambient air quality condition but is not expected to significantly reduce air quality.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		No significant cumulative effects are anticipated associated with noise generated by implementation of a reservoir alternative over the 2-year construction period. During seasonal use of farm equipment in the Greybull River Valley, there would be a slightly larger area in which more agricultural operations would be occurring.
		During the construction phase there will be a cumulative increase in traffic on the roads in the area from construction equipment and workers traveling to and from the site.
		Conversion of native habitat to agriculture has altered the species composition of bird, mammal, and reptile/amphibian communities, by increasing diversity but reducing abundance of some species. Conversion of crops from native hay and alfalfa to sugar beets and beans has also likely reduced the abundance of native species. The conversion of 1,400 acres of currently fallow land to irrigated lands will add to this reduction; however, species effected are typically abundant in agricultural areas and impacts would be considered insignificant.
		Irrigation in the Greybull River Valley has increased wetland acreage throughout the valley and along the floodplain due to irrigation practices and return flows. The proposed project would result in a change in the agricultural practices in the Greybull River Valley. It is anticipated that additional acreage would be put into crop production and a change in cropping patterns would result. These changes would necessitate changes in irrigation practices in the valley with an overall net increase in the amount of water used for irrigation. Additional irrigation may increase the overall wetland acreage in the valley; however, reduced river flows may slightly decrease the amount of floodplain wetlands (see revised Table 4.4, page 2 - 7). The cumulative result will likely be an overall increase in wetland acreage in the Greybull River Valley. As improvement in irrigation delivery systems occur, there is likely to be a net decline in wetlands in the valley.
		Implementation of either of the two reservoir alternatives would be expected to result in similar changes in crops and cropping patterns. These potential effects are fully described for the action alternatives in Chapter 1.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		Construction of the reservoir would affect long-term employment and population in the project area because agricultural output would increase. An estimated 35 new jobs are created in the Wyoming economy for each $1 million in additional agricultural output in the state (USDC 1992). Lower Roach Gulch Reservoir would increase irrigation water availability in the GVID by approximately 23,500 acre-feet annually, and agricultural output is expected to increase by $2.5 million annually as a result (GEI 1994a). This increase in agricultural production would result in an estimated 88 new jobs in the regional economy.
		The socioeconomic impacts analyses conducted, based impacts on the existing conditions which are assumed to be a result of past actions in the Greybull River Valley. The potential impacts to these existing conditions are identified. Since no additional future actions have been identified which compound those that may result from project implementation, the impacts identified in Section 4.8 SOCIOECONOMICS are the foreseeable cumulative impacts from the project
		Due to the increase in agriculture in the valley as a result of the project, there are expected changes in agriculture practices. Increased acreage in production and increased production of higher value crops will likely result in increased use of pesticides, fungicides, and herbicides. Additionally, farming and irrigation practices will likely become more efficient over time. No plans for improving irrigation efficiency on a large scale have been identified, however, individual farmers may increase efficiency by lining irrigation ditches, installing irrigation pipelines, and converting to sprinkler systems. Effects associated with altered agricultural practices as a result of the project are not expected to be significant.
		Irrigation has resulted in more stable flows in the lower Greybull River and converted the aquatic community from a non-game fishery to a marginal trout fishery. The construction of Upper Sunshine Reservoir and Lower Sunshine Reservoir have established a cold water fishery. However, diversions into the two reservoirs have likely reduced the quality of the trout fishery in the upper Wood and Greybull rivers downstream from the diversions. The project will not impact the upper Wood and Greybull Rivers but will improve the Upper Sunshine fishery and slightly improve the lower Greybull River fishery.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
		The project may have a cumulative benefit to the sport fisheries in the Greybull River Valley. Through an agreement between the GVID, WWDC, and WGFD (Appendix E) improvements to the fishery in Upper Sunshine Reservoir should result. The agreement allows for establishing a minimal pool in Upper Sunshine Reservoir and funds for restocking fish should encroachment on the minimum pool occur. Additionally, cumulative effects on sport fisheries in the valley may include establishment of a warm water fishery in the lower valley reservoir (see letters 14 and 18 in Chapter 3.0). Overall, the cumulative effect on recreational fishing in the Greybull River Valley will include more opportunities for better fishing and potentially more fishing opportunities. With the addition of a lower valley reservoir there will be a cumulative increase in recreational opportunities such as boating, fishing, swimming, waterfowl hunting, and sight seeing. There will also be an increase in the number of visitors to the public lands south of the reservoir due to the new point of access. This increase in human use may result in additional erosion on unimproved roads and litter in undeveloped areas.
5 - 9 1	Species list for wetland reclamation/mitigation.	Wetland mitigation will occur along the Greybull River riparian corridor. The following species are common in wetlands along the Greybull River and would be appropriate for planting or seeding in wetlands created in the floodplain: Baltic rush (Juncus balticus) Three-square bulrush (Scirpus pungens) Olney's bulrush (Scirpus americanus) Creeping spikerush (Eleocharis palustris) Wooly sedge (Carex lanuginosa) Nebraska sedge (Carex nebraskensis) Rabbitfoot polypogon (Polypogon monspeliensis) Garrison's creeping foxtail (Alopecurus arundinaceus) Brookgrass (Catabrosa aquatica) Sandbar willow (Salix exigua)
5 - 17 3 first bullet	The reservoir would be flushed during peak runoff periods to reduce the potential for adverse effects from increased suspended sediment loads released to the river.	This bullet has been deleted for clarification and to reduce redundancy.

Page Number Paragraph Line Number	Text in DEIS	Text Changes
5 - 15 6th bullet	Species list for reclamation.	The plant list has been changed to the following: Slender wheatgrass (Elymus trachycaulus var. Pryor) Western wheatgrass (Elymus pascopyrum var. Rosana) Bottlebrush squirreltail (Elymus elymoides) Indian ricegrass (Oryzopsis hymenoides var. Rimrock) Needle-and-thread (Stipa comata) Alkali sacaton (Sporobolus airoides) Gardners saltbush (Atriplex gardneri) Yarrow (Achillea millefolium) Big sagebrush (Artemisia tridentata)
7 - 1	OK.	The following references are added to the list. Engberg, R.A. and A.J. Cappellucci, 1993, Remediation of Water Quality Problems Associated with Drainwater from Department of the Interior Irrigation Projects, in proceedings of the Sixth Billings Symposium, Planning, Rehabilitation, and Treatment of Disturbed Lands, Reclamation Research Unit Publication No. 9301, Office of Surface Mining, Denver, Colorado. Goodman, A.S. 1984. Principles of Water Resources Planning. Prentice-Hall, Inc., Englewood Cliffs, New Jersey Tietge, J.E., D.R. Mount, and D.D. Gulley. 1994. The GRI freshwater STR model and computer program: Overview, validation, and application. Gas Research Institute, Chicago, Illinois.

Table 4.1 Summary of environmental effects analysis by issue and alternative.

	Alternative			
Impact by Resources	Lower Roach Gulch	Blackstone Gulch	No Action	Mitigation
		LAND FEATURES		
GEOLOGY AND SOILS				
Erosion of siltstones and claystones of Willwood Formation at reservoir site	Erosion will reduce effective life of project; 2,500 acre-feet sediment storage pool in reservoir design; reduction of 28.6 acre-feet/year sediment loading in GR	Erosion will reduce effective life of project; 2,500 acre-feet sediment storage pool in reservoir design; reduction of 20-25 acre-feet/year sediment loading in GR Erosion of dispersive clays and highly saline material removed during construction of the diversion tunnel may cause significant impacts to water quality and plant communities.	No concerns over erosion; no reduction in sediment loading in GR	Punctual and successful reclamation of disturbed areas
MINERAL RESOURCES				
Loss of mineral resources at reservoir site	NSO stipulation attached to land; no significant loss to extractable coal	NSO stipulation attached to land; no significant loss to extractable coal	No impacts to mineral resources	
		WATER RESOURCES		
SURFACE HYDROLOGY				
Reregulation of GR flows	Net result of leveling of flows in lower GR; significant benefits of irrigation water conservation	Similar impacts as LRG Alternative	No flow reregulation or irrigation water conservation	
Timing of irrigation water delivery	Time between order for water and delivery reduced; recapture of water released from Sunshine reservoirs possible if not needed	Similar impacts as LRG Alternative	No reduction in time of water delivery	
GR system depletions	Depletion of flow at mouth of GR by ≈5,480 acre-feet/yr; increase flow at mouth of Dry Creek by ≈2,120 acre-feet/year	Similar impacts as LRG Alternative	No new depletions at mouth of GR; no increase flow at mouth of Dry Creek	
Evaporation losses	Evaporation loss increase of ≈1,700 acre-feet/yr	Slightly greater losses than LRG Alternative due to configuration of reservoir and length to delivery	No new evaporation losses	
Dam failure	Substantial flooding in Greybull 6 hours after dam break	Similar impacts as LRG Alternative; slightly longer time for water to reach Greybull	No new potential for a dam break	

	Alternative			
Impact by Resources	Lower Roach Gulch	Blackstone Gulch	No Action	Mitigation
Flooding above diversion dam	No increased potential for flood damage above diversion dam	No increased potential for flood damage above diversion dam	No increased potential for flood damage	
Hydropower development	No potential for hydropower development	No potential for hydropower development	No potential for hydropower development	
WATER QUALITY				
Total dissolved solids	TDS in reservoir will range between 400-700 mg/L; no significant change expected to TDS in GR	Similar impacts as LRG Alternative	No changes in TDS	Proper erosion control employed during construction Adherence to NPDES permit requirements Flushing diversion dam during high flows
Sediment loading	Variable effects to GR sediment loading; diversion dam and reservoir will act as sediment traps thus generally reducing sediment load in GR downstream of diversion dam	Similar impacts as LRG Alternative	No changes in sediment loading	*same*
Turbidity	Variable effects to GR turbidity; turbidity in reservoir water potentially higher than GR water	Similar impacts as LRG Alternative	No changes to turbidity	*same*
Other water quality concerns	No significant increase in conventional pollutants expected; no significant impact to groundwater quality expected	Similar impacts as LRG Alternative	No changes to other water quality concerns	*same*
GROUNDWATER HYDROLOGY				
Groundwater availability	Increased groundwater levels expected due to increased recharge from increased irrigation	Similar impacts as LRG Alternative	No changes to groundwater availability	
WATER RIGHTS				
Water right priority	Reservoir will have later priority water right than existing rights; increased supplies to shareholders in valley; return flows from increased irrigation available to other rights	Similar impacts as LRG Alternative	No impacts to water rights	
		AIR QUALITY		
Impacts from construction	Temporary increase in fugitive dust, TSP and exhaust emissions during construction	Similar impacts as LRG Alternative	No air quality impacts from construction	Implementation of dust control measures during construction

	Alternative			
Impact by Resources	Lower Roach Gulch	Blackstone Gulch	No Action	Mitigation
Long term impacts	Increased dust, TSP, and exhaust emissions from increased agriculture activity in Basin	Similar impacts as LRG Alternative	No long term impacts	
		NOISE		
Increased noise from construction	Potential impacts to nesting raptors; no other significant impacts expected	Similar impacts as LRG Alternative	No impacts from noise	
Increased noise from increased agriculture activity in Basin	No significant impacts expected	No significant impacts expected	No impacts from noise	
		BIOLOGICAL RESOURCES		
WETLANDS				
Impacts at diversion dam and along canal route	≈0.88 acres impacted; new wetlands formed at canal terminus	No wetlands impacted	No wetlands impacted	In-kind on-site creation of wetlands in GR riparian corridor
Impacts at reservoir site	≈2.16 acres impacted; new wetlands formed around shoreline	≈0.55 acres impacted; new wetlands formed around shoreline	No wetlands impacted	*same*
Impacts along return flow route	≈0.57 acres impacted	≈0.02 acres impacted	No wetlands impacted	*same*
Impacts along GR	≈1.15 acres impacted; ≈6.2 river-miles between diversion and return flow	≈1.46 acres impacted; ≈3.9 river-miles between diversion and return flow	No wetlands impacted	*same*
Other wetland impacts	Net increase in wetlands in valley due to increased irrigation (e.g. seeps along canals, inefficient irrigation practices); potential increase in wetlands along Dry Creek due to increased return flow	Similar impacts as LRG Alternative	No wetlands impacted	
VEGETATION				
Impact to plant communities	Loss of ≈551 acres of mixed grassland-sagebrush shrubland, 19 acres mixed riparian shrub-shrub steppe, 105 acres rocky outcrops; impacts to ≈1,025 acres mixed grassland-sagebrush shrubland; ≈1,400 acres of currently idle land irrigated	Loss of ≈680 acres of mixed grassland-sagebrush shrubland, ≈16 acres mixed riparian shrub-shrub steppe, ≈34 acres rocky outcrops; impacts to additional acres mixed grassland-sagebrush shrubland (similar to LRG); ≈1,400 acres of currently idle land irrigated	No impacts to plant communities	Successful reclamation (revegetation) of disturbed areas
	Potential for invasion of noxious weeds in disturbed areas	Potential for invasion of noxious weeds in disturbed areas	No new invasion of noxious weeds	Proper weed control measures employed

	Alternative			
Impact by Resources	Lower Roach Gulch	Blackstone Gulch	No Action	Mitigation
WILDLIFE				
Impacts to mammals	Probable change in mammal community on site; slightly reduced carrying capacity	Similar impacts as LRG Alternative	No impacts to mammals	Minimization of habitat disturbance
Impacts to birds	Probable change in bird community on site; slightly reduced upland carrying capacity; increase in waterbird carrying capacity	Similar impacts as LRG Alternative	No impacts to birds	*same*
Impacts to reptiles & amphibians	Probable change in reptile & amphibian community on site; slightly reduced carrying capacity	Similar impacts as LRG Alternative	No impacts to reptiles & amphibians	same
AQUATIC RESOURCES				
Impacts to fish	Diversion structure would block fish passage in GR during low flow periods; altered flows would slightly degrade aquatic habitat	Similar impacts as LRG Alternative	No impacts to fish	Fish passage provided at diversion dam Minimum bypass flows of 50 cfs (or inflow) at diversion dam
Impacts to invertebrate Community	No impacts anticipated	No impacts anticipated	No impacts to invertebrates	*same*
SPECIES OF SPECIAL INTEREST				
Impacts to raptors	Potential disturbance to nesting raptors from construction activity; insignificant loss of habitat to raptors	Similar impacts as LRG Alternative	No impacts to raptors	No construction within 0.5 mile of an active nest
Impacts to waterfowl and waterfowl habitat	Net increase in waterfowl habitat and waterfowl use in Basin	Similar impacts as LRG Alternative	No impacts to waterfowl	
Impacts to big game crucial range or migration routes	No impacts to crucial range or migration routes	Similar impacts as LRG Alternative	No impacts to big game	
Impacts to upland game birds	No impacts to sage grouse leks; insignificant loss of ≈675 acres of sage grouse brood rearing and winter habitat	No impacts to sage grouse leks; insignificant loss of ≈730 acres of sage grouse nesting, brood rearing, and winter habitat	No impacts to upland game birds	
THREATENED, ENDANGERED, & CANDIDATE SPECIES				
Impacts to T&E species	Net increase in foraging habitat for migrant and winter resident bald eagles and peregrine falcons	Similar impacts as LRG Alternative	No impacts to T&E species	
Impacts to candidate species	No significant impacts anticipated	No significant impacts anticipated	No impacts to candidate species	
Impacts to Wyoming species of concern	No significant impacts anticipated	No significant impacts anticipated	No impacts to Wyoming species of concern	

	Alternative			
Impact by Resources	Lower Roach Gulch	Blackstone Gulch	No Action	Mitigation
		LAND USE		
CROPS & CROPPING PATTERN				
Changes in crops	≈ 2.5% increase in dry beans, 2.5% increase in sugar beets, 3.3% decrease in malt barley, 1.7% decrease in alfalfa grown in valley	Similar impacts as LRG Alternative	No change in cropping patterns	
Changes in acreage in valley	≈ 1,400 additional acres of crop land will be irrigated	Similar impacts as LRG Alternative	No additional acres irrigated	
Reduction in irrigation shortages	Irrigation shortages reduced to approximately 3,600 acre-feet/yr	Similar impacts as LRG Alternative	No reduction in irrigation shortages	
LIVESTOCK GRAZING				
Lost AUMs at reservoir site	Loss of 2.1% of Tatman Mountain Common Allotment AUMs	Loss of 1.3% of Fernandez/Blu-Jay Allotment AUM's and 52.6% of North Blackstone Allotment AUM's	No loss of livestock AUM's	Permittee's choice to apply for a new allotment
		SOCIOECONOMICS		
POPULATION & EMPLOYMENT				
Temporary construction work force	≈135 workers employed first year and 190 employed second year	≈147 workers employed first year and 207 employed second year	No temporary work force	
Population increase	≈260 people in first year and 317 people in second year	≈286 people in first year and 348 people in second year	No population increase	
INCOME				
Increase in household income	≈$6.7 million increase in local household income over 2 year period	≈$7.3 million increase in local household income over 2 year period	No increase in household income	
Long term effects from increased agriculture	≈$856,000 increase in farm income in Basin	Similar increase as LRG Alternative	No increase in farm income	
IRRIGATED AGRICULTURE				
Reduction of total crop failure	Reduction or elimination of years with widespread crop failures due to drought	Similar impacts as LRG Alternative	No change in crop failure rate	
Increase current crop yields	Irrigation water provided by alternative will allow efficient and timely application of irrigation water to maximize crop yields	Similar impacts as LRG Alternative	No change in current irrigation system	
Increased cost of irrigation	≈$19/share cost for 1 acre-foot of irrigation water from LRG	≈$21/share cost for 1 acre-foot of irrigation water from BG	No increase in cost of irrigation water	

Impact by Resources	Alternative			Mitigation
	Lower Roach Gulch	Blackstone Gulch	No Action	
LOCAL INFRASTRUCTURE				
Impacts to housing	Temporary housing needed for ≈81 households during first year and 114 household during the second year	Temporary housing needed for ≈90 households during first year and 125 household during the second year	No increased demands for housing	Temporary housing or lease agreements with existing housing provided
Increased traffic in area	No significant impacts to roads or traffic safety anticipated	No significant impacts to roads or traffic safety anticipated	No change in traffic	
New roads for facilities access	Approximately 2.54 acres of mixed grassland-sagebrush shrubland lost	Approximately 5.09 acres of mixed grassland-sagebrush shrubland lost	No new roads constructed	
Increased demands for law enforcement	One deputy in Big Horn County needed	Similar impacts as LRG Alternative	No increased need for law enforcement	Additional county deputies employed
Increased need for emergency medical services	Increased demand for emergency medical services for accidents associated with construction	Similar impacts as LRG Alternative	No increased need for emergency medical services	Maintenance of emergency medical response plan and equipment on-site
PUBLIC REVENUES				
Increase in sales and use taxes	≈$212,000/yr generated in sales and use tax for Park County and $265,000/yr for Big Horn County during construction; ≈$16,000/yr increase in sales and use tax over long term; loss of ≈$241/yr property taxes to Park County	≈$233,000/yr generated in sales and use tax for Park County and $291,500/yr for Big Horn County during construction; ≈$16,000/yr increase in sales and use tax over long term; loss of ≈$180/yr property taxes to Park County	No increase in sales and use tax	
LANDOWNERSHIP AND USE				
Loss of private land to project	≈355 acres of private land would be purchased by GVID	≈50 acres of private land would be purchased by GVID	No loss of private land	Purchase of private land
CULTURAL & PALEONTOLOGICAL RESOURCES				
Impacts to cultural sites	Potential impacts dependant on results of evaluative testing at two sites potentially eligible for nomination to the National Register of Historical Sites; potential impacts to one site of unknown eligibility	No sites eligible for nomination to the National Register of Historical Sites; no impacts anticipated	No impacts to cultural resources	Data recovery at sites eligible for the NRHP
Impacts to paleontological resources	Fossils in Willwood Formation will be impacted.	Fossils in Willwood Formation will be impacted	No impacts to paleontological resources	Surveys, salvage, and recovery of identified resources

Impact by Resources	Alternative Lower Roach Gulch	Blackstone Gulch	No Action	Mitigation
	RECREATIONAL RESOURCES			
FISHING				
Impacts to area fishery	Potential positive impact to Upper Sunshine Reservoir fishery due decreased invasion of 5,000 acre-feet minimum pool	Similar impacts as LRG Alternative	No impacts to area fishery	
HUNTING				
Impacts to hunting	Potential increase in hunting opportunities due to improved access to public lands around reservoir site	Similar impacts as LRG Alternative	No impacts to hunting	
NONCONSUMPTIVE RECREATION				
Impacts from increased human use	Potential increase in human use related impacts on public lands; potential increase in trespass related impacts on private land near site	Similar impacts as LRG Alternative	No new impacts	
	VISUAL/AESTHETICS			
Impacts to visual environment	No change in VRM classification of site; no significant impacts	Similar impacts as LRG Alternative	No impacts to visual environment	

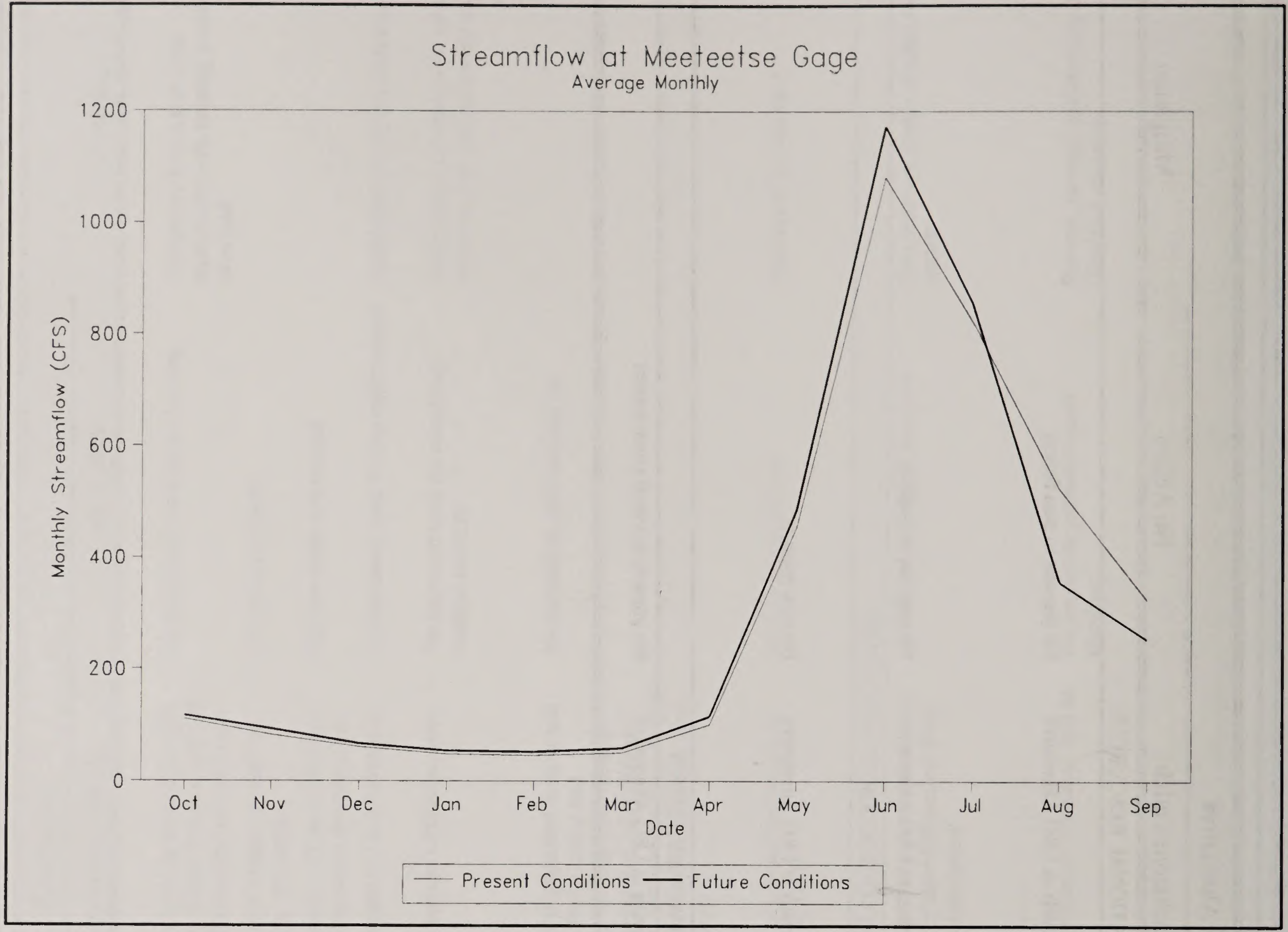


Figure 2.1 Modeled average monthly pre and post-project flows, Greybull River at Meeteetse station.

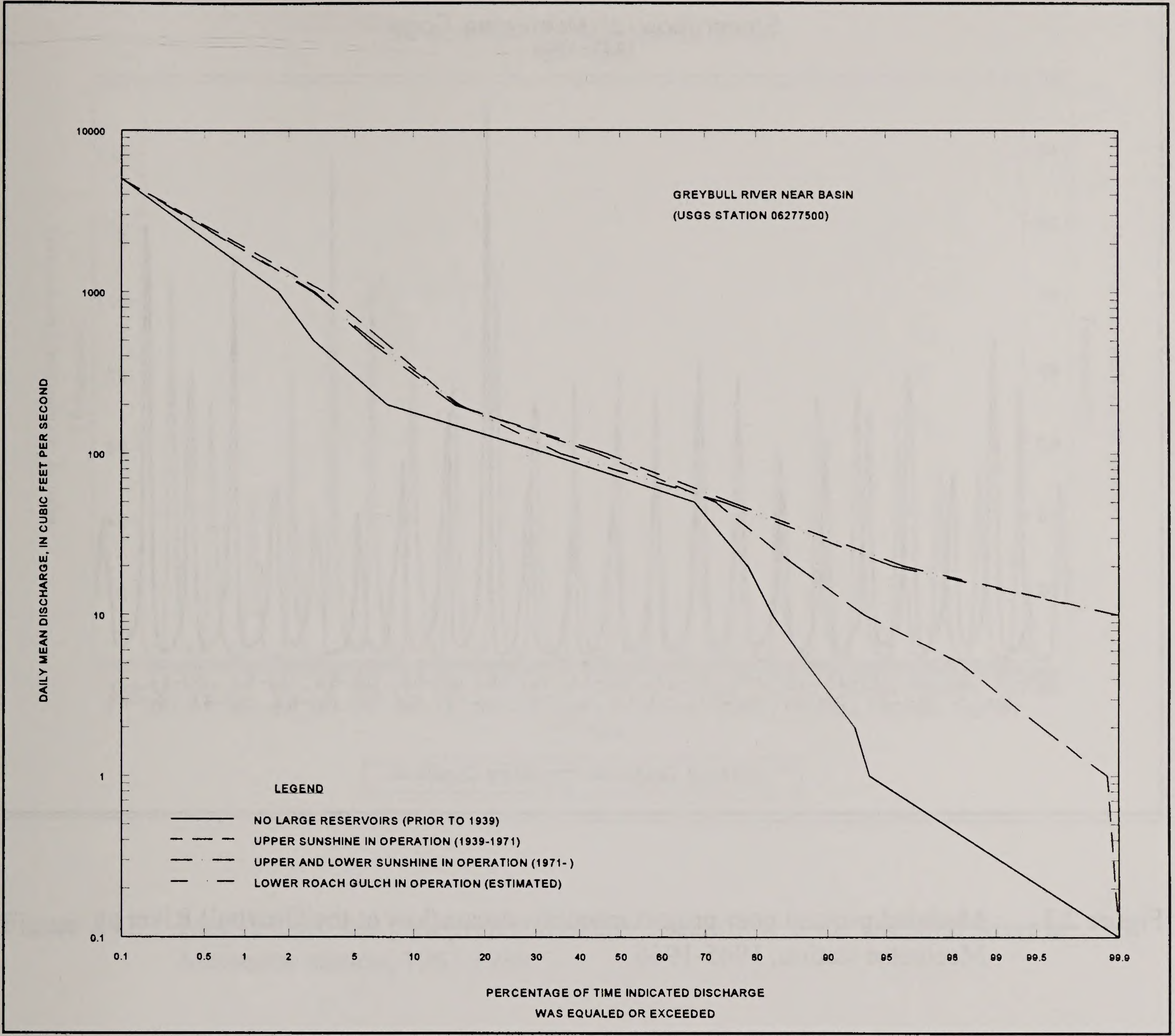


Figure 2.2 Daily flow duration curves at the Greybull River near Basin Station showing past and estimated future effects of construction of large reservoirs.

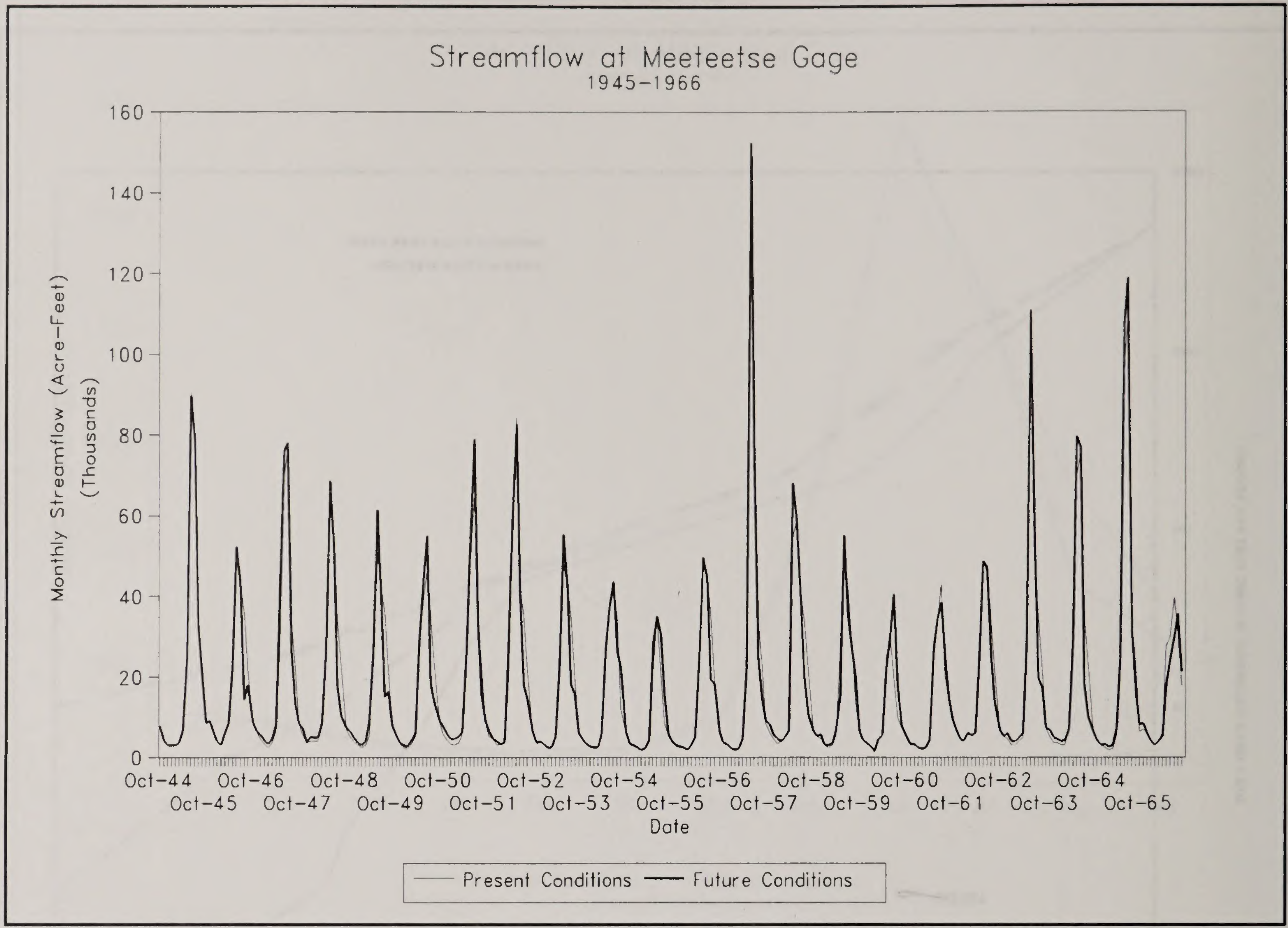


Figure 2.3 Modeled pre and post-project monthly streamflow at the Greybull River at Meeteetse station, 1945-1966.

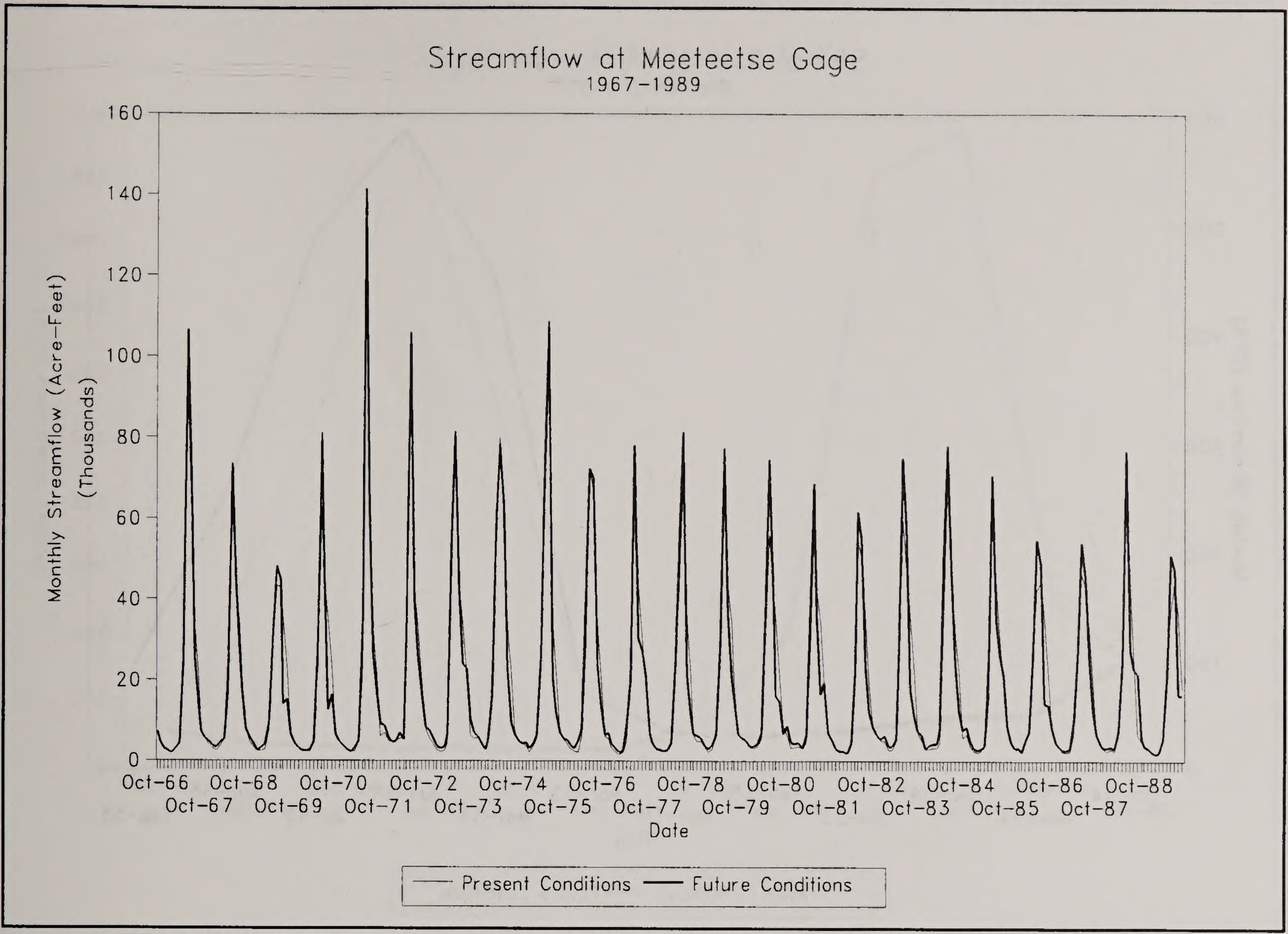


Figure 2.4 Modeled pre and post-project monthly streamflow at the Greybull River at Meeteetse station, 1967-1989.

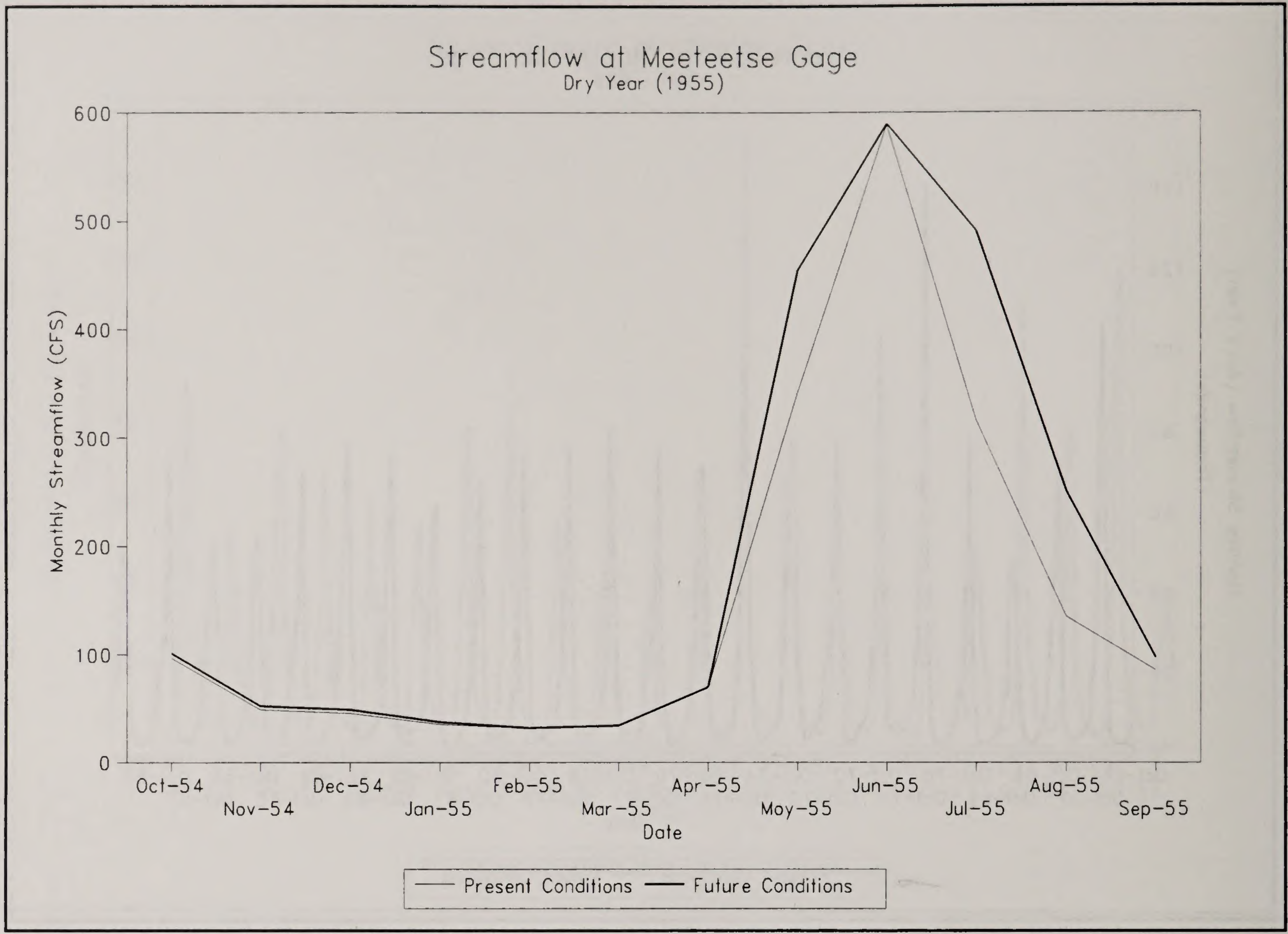


Figure 2.5 Modeled pre and post-project monthly streamflow at the Greybull River at Meeteetse station during a typical dry year (1955).

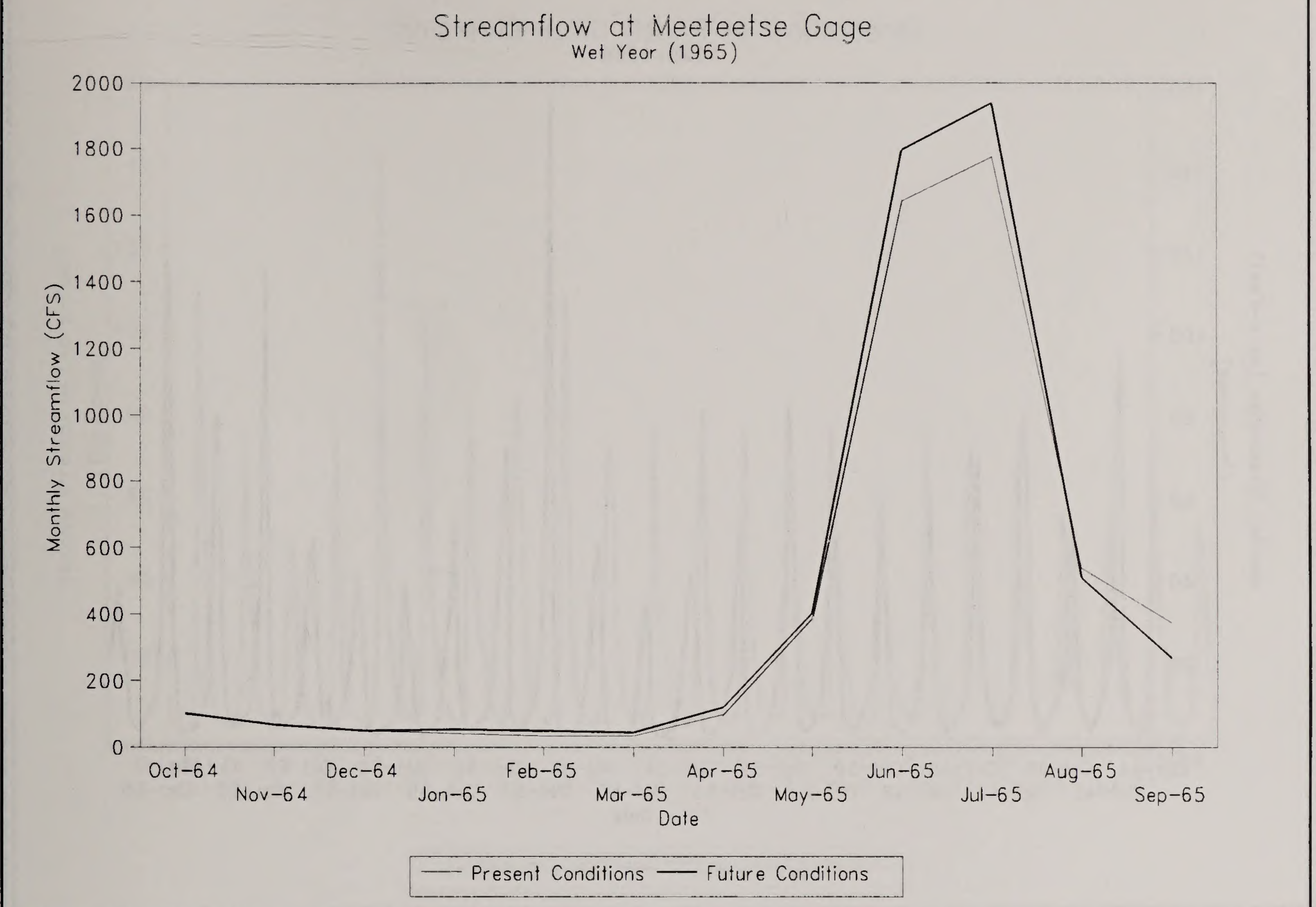


Figure 2.6 Modeled pre and post-project monthly streamflow at the Greybull River at Meeteetse station during a typical wet year (1965).

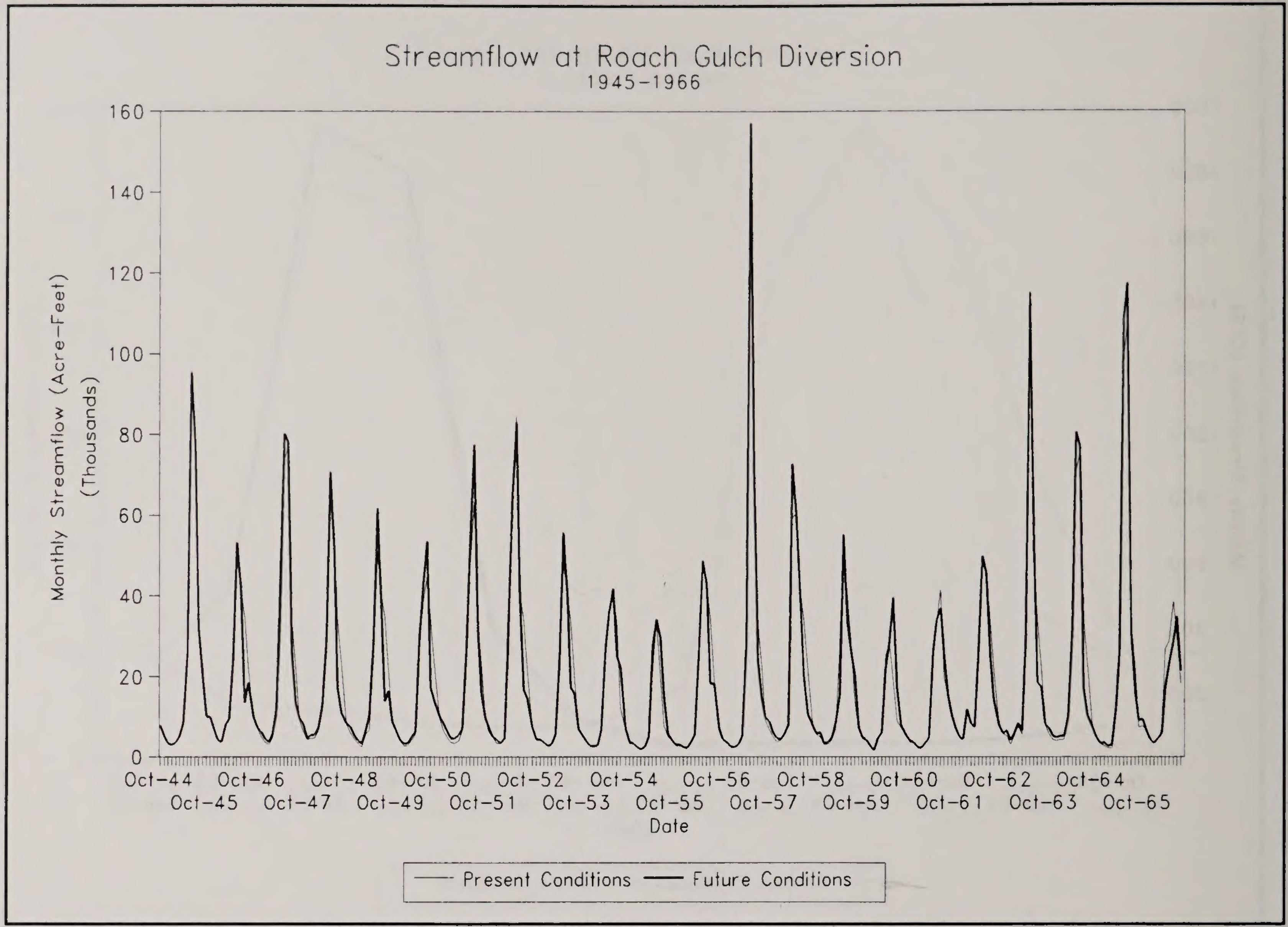


Figure 2.7 Modeled pre and post-project monthly streamflow in the Greybull River at the Lower Roach Gulch Reservoir diversion point, 1945-1966.

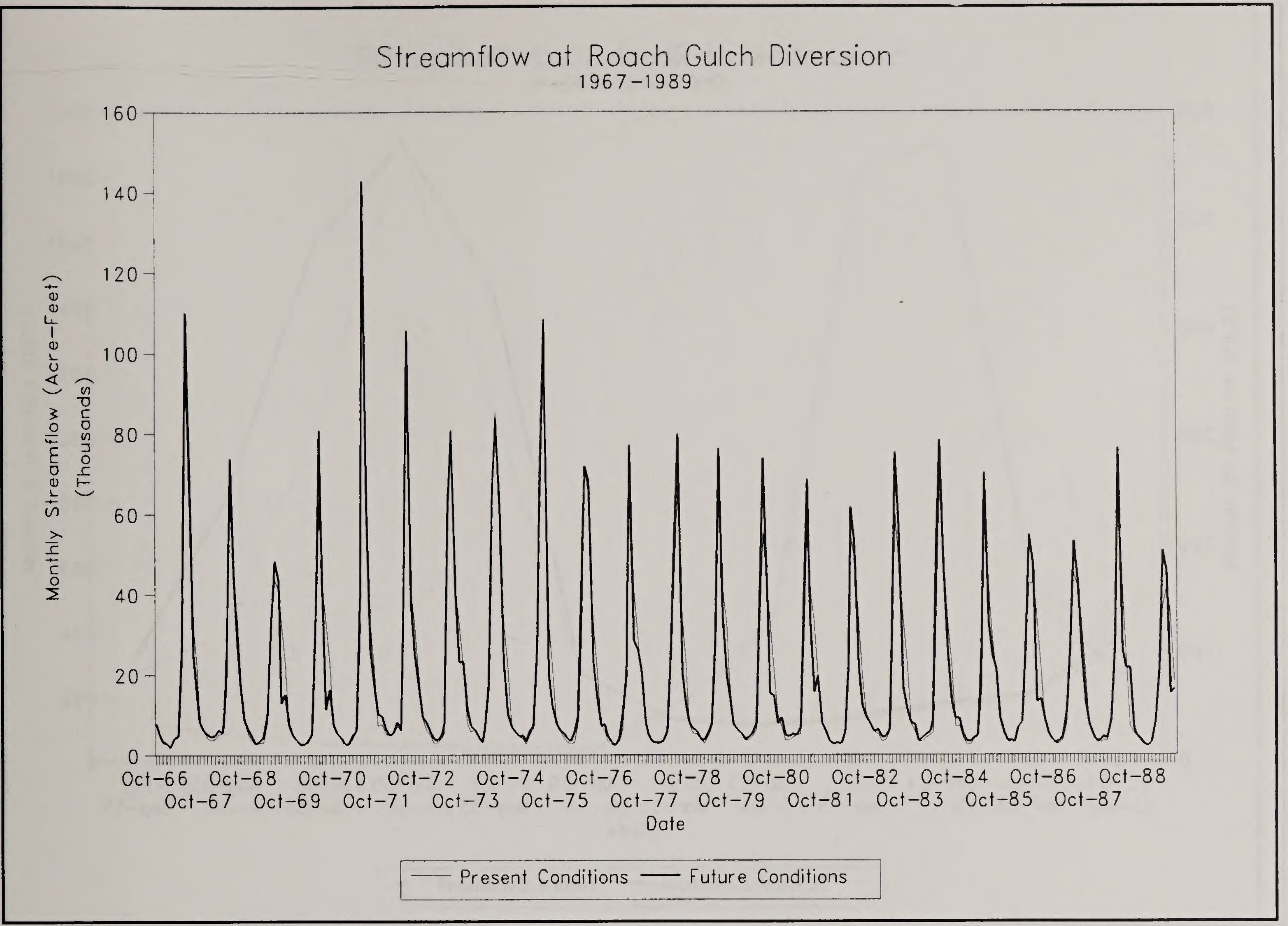


Figure 2.8 Modeled pre and post-project monthly streamflow in the Greybull River at the Lower Roach Gulch Reservoir diversion point, 1967-1989.

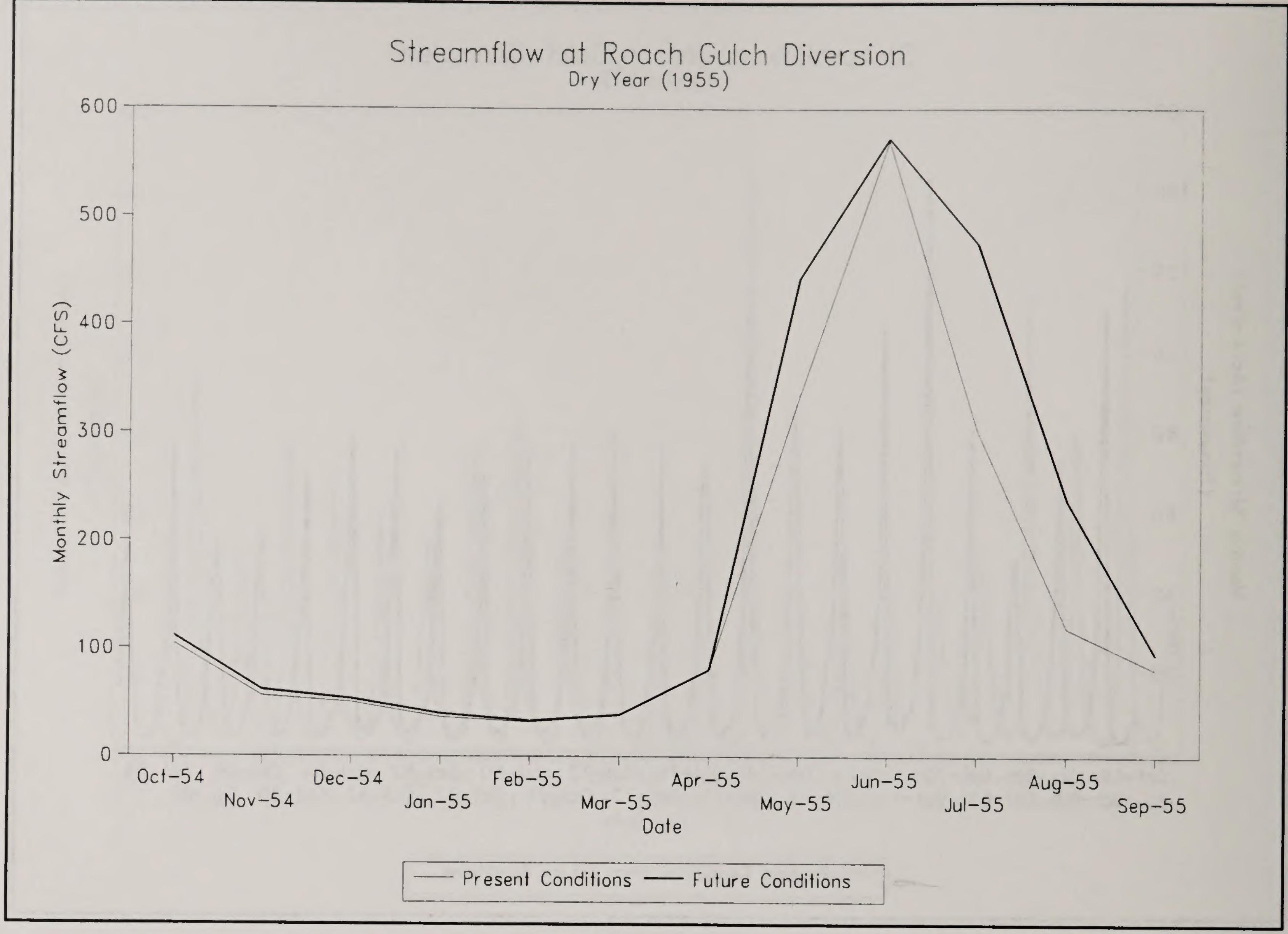


Figure 2.9 Modeled pre and post-project monthly streamflow in the Greybull River at the Lower Roach Gulch Reservoir diversion point during a typical dry year (1955).

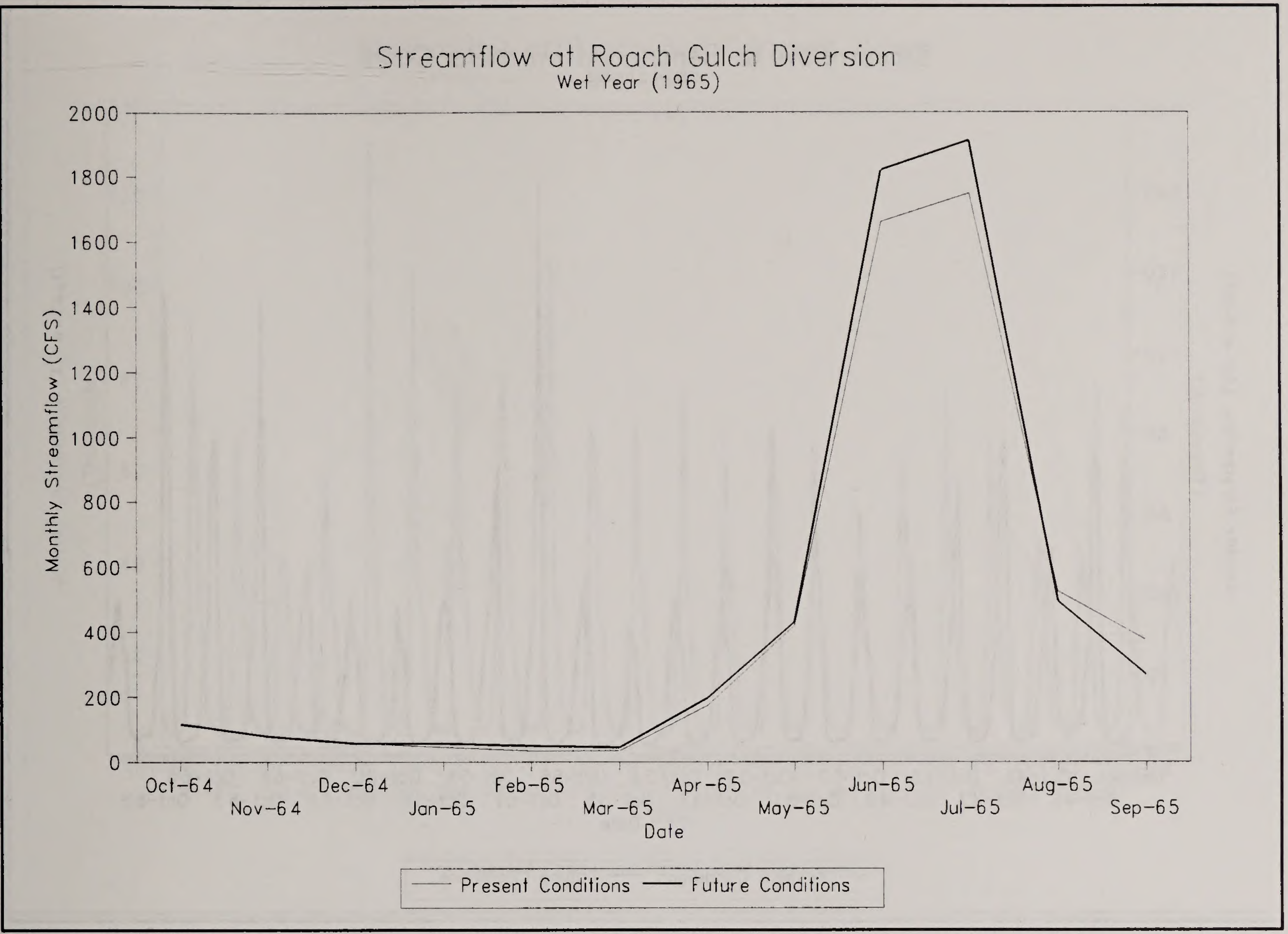


Figure 2.10 Modeled pre and post-project monthly streamflow in the Greybull River at the Lower Roach Gulch Reservoir diversion point during a typical wet year (1965).

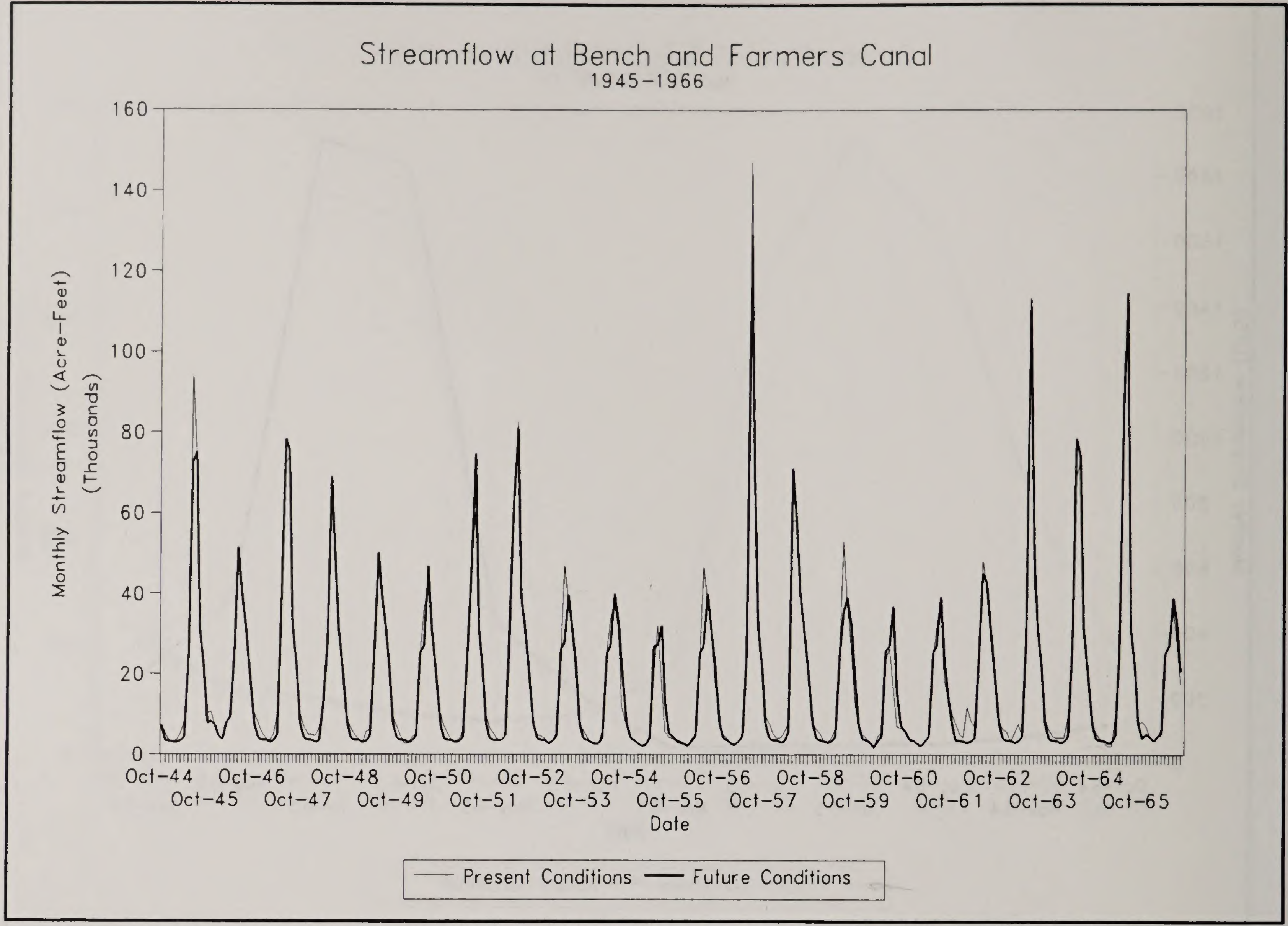


Figure 2.11 Modeled pre and post-project monthly streamflow in the Greybull River at the Bench and Farmers Canal diversion point, 1945-1966.

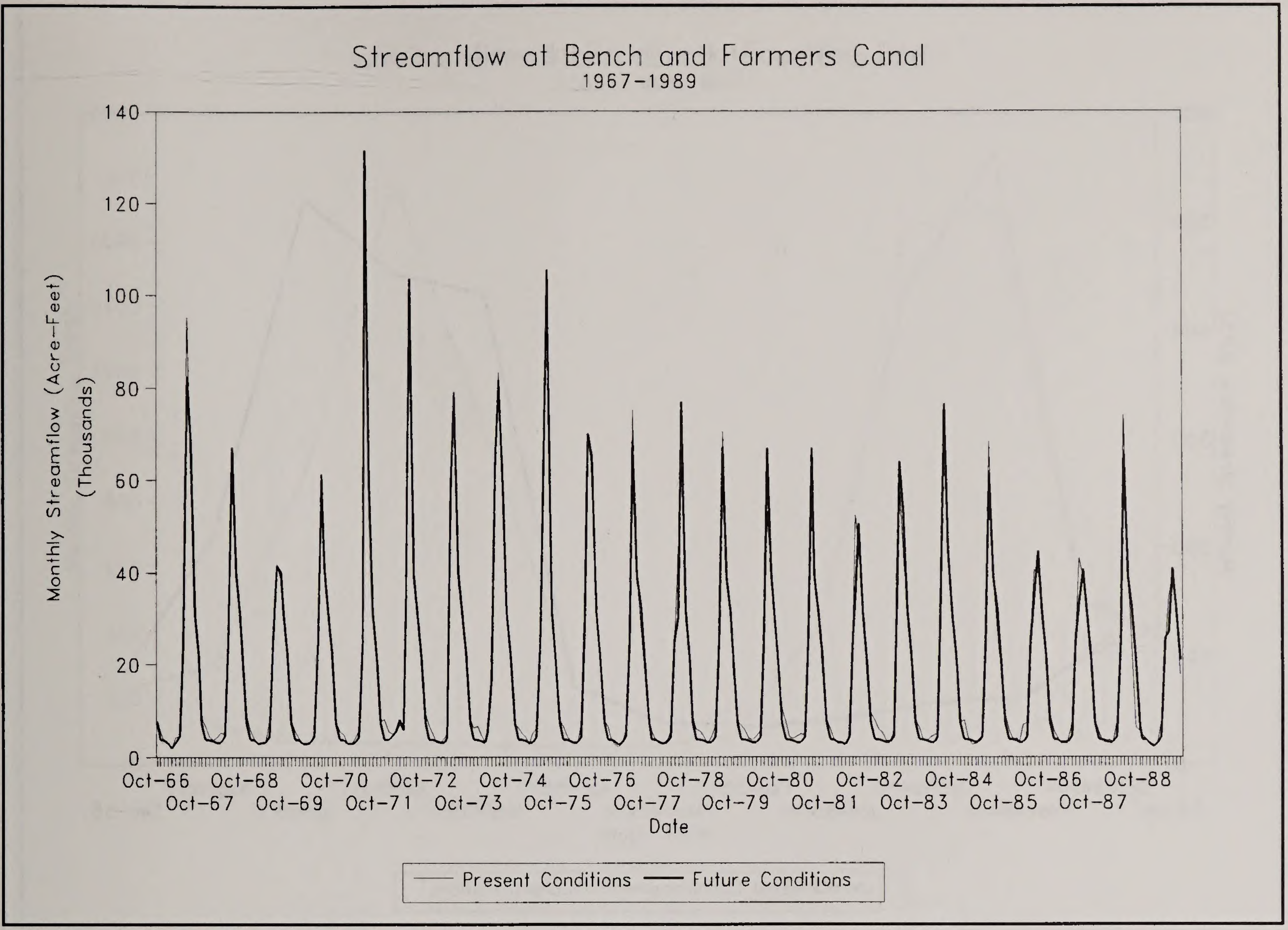


Figure 2.12 Modeled pre and post-project monthly streamflow in the Greybull River at the Bench and Farmers Canal diversion point, 1967-1989.

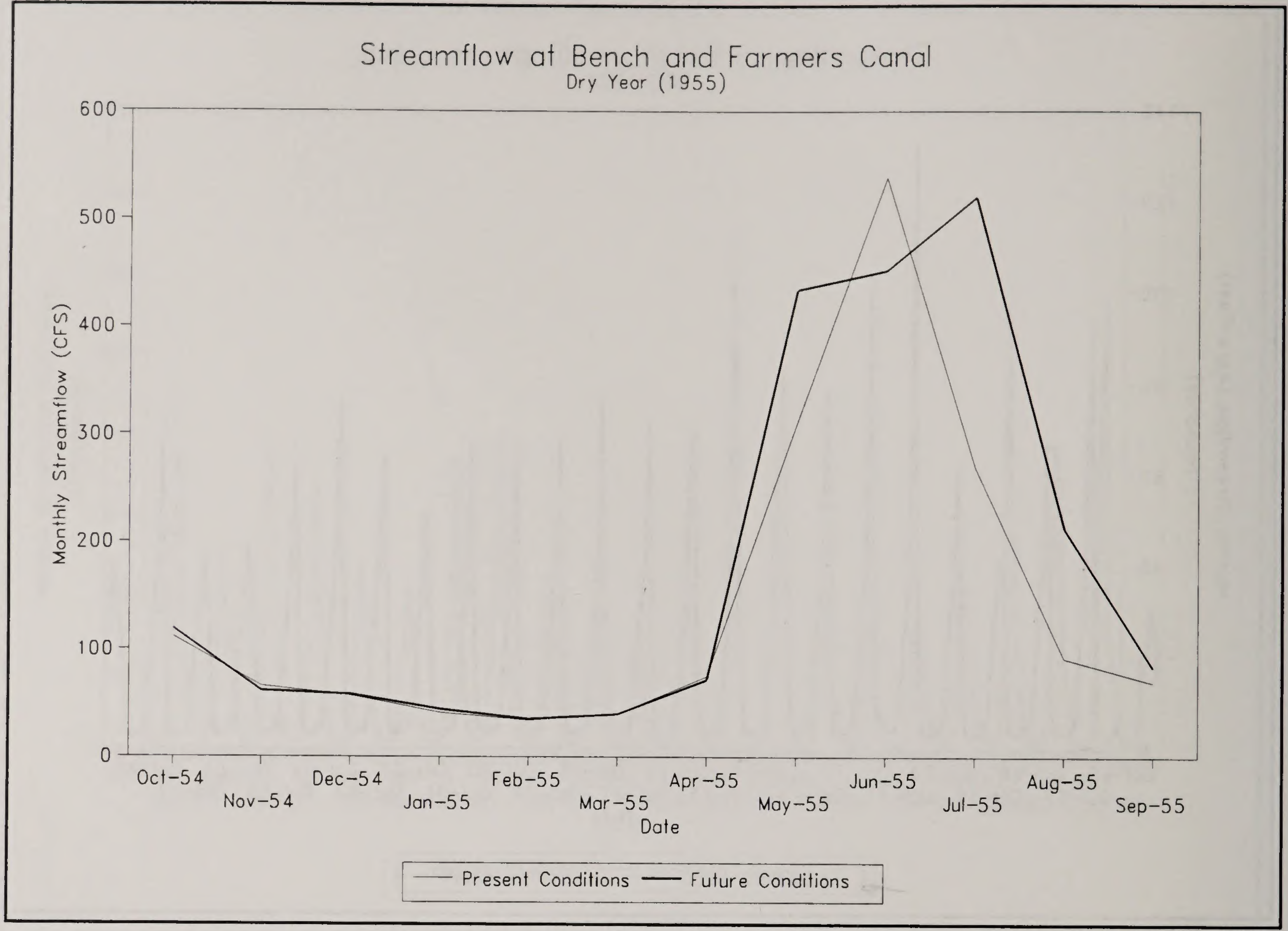


Figure 2.13 Modeled pre and post-project monthly streamflow in the Greybull River at the Bench and Farmers Canal diversion point during a typical dry year (1955).

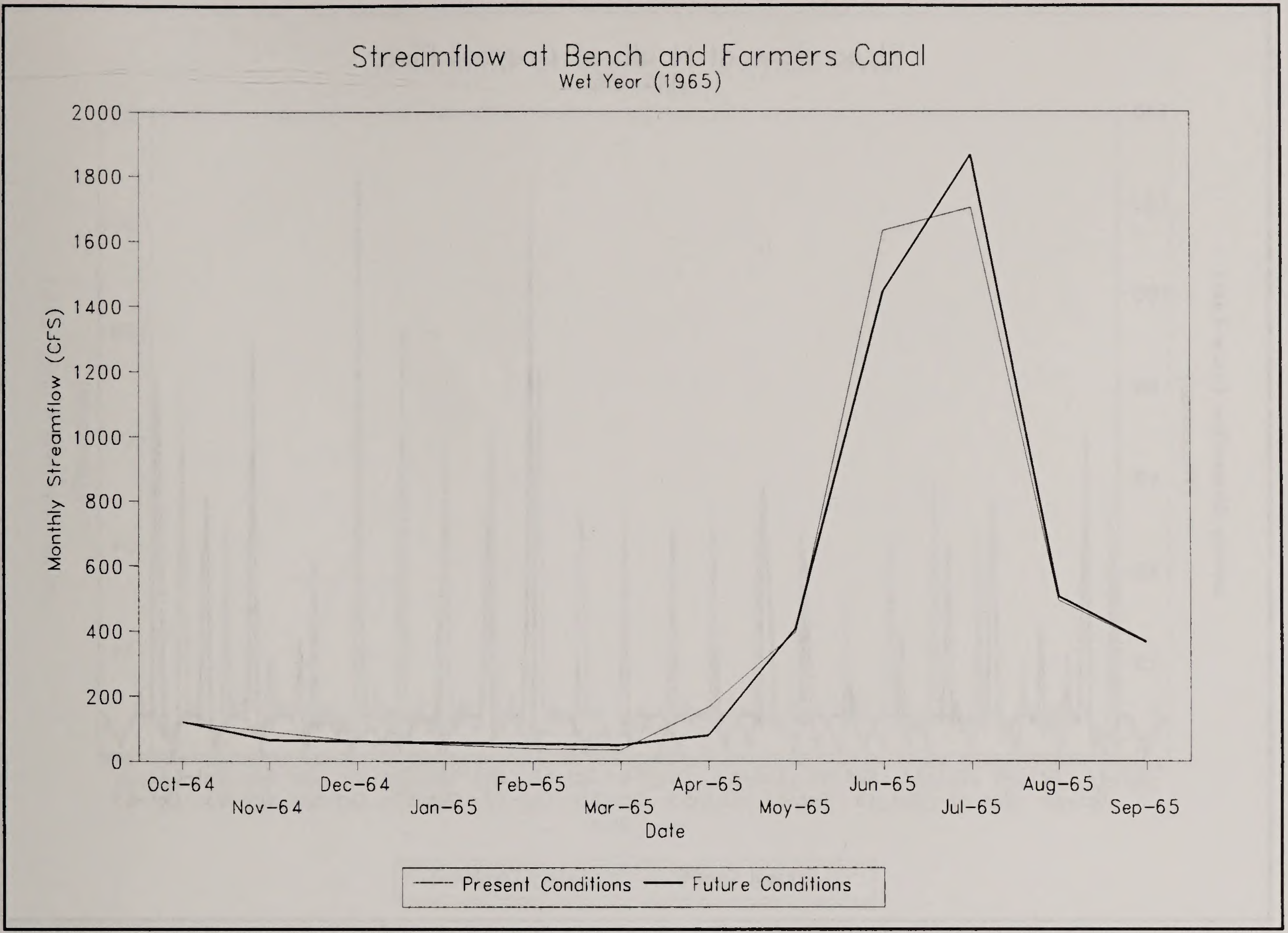


Figure 2.14 Modeled pre and post-project monthly streamflow in the Greybull River at the Bench and Farmers Canal diversion point during a typical wet year (1965).

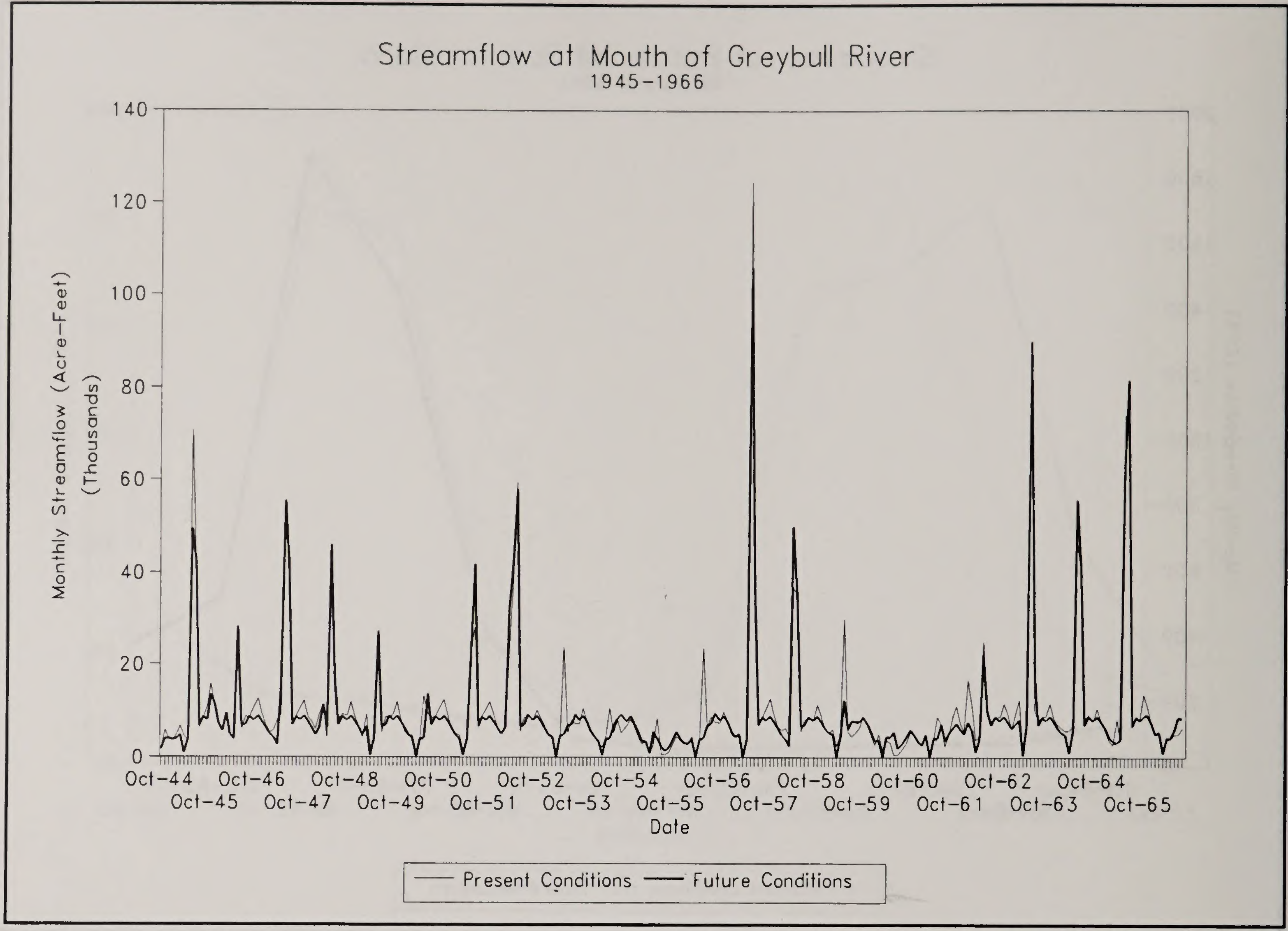


Figure 2.15 Modeled pre and post-project monthly streamflow in the Greybull River at the mouth, 1945-1966.

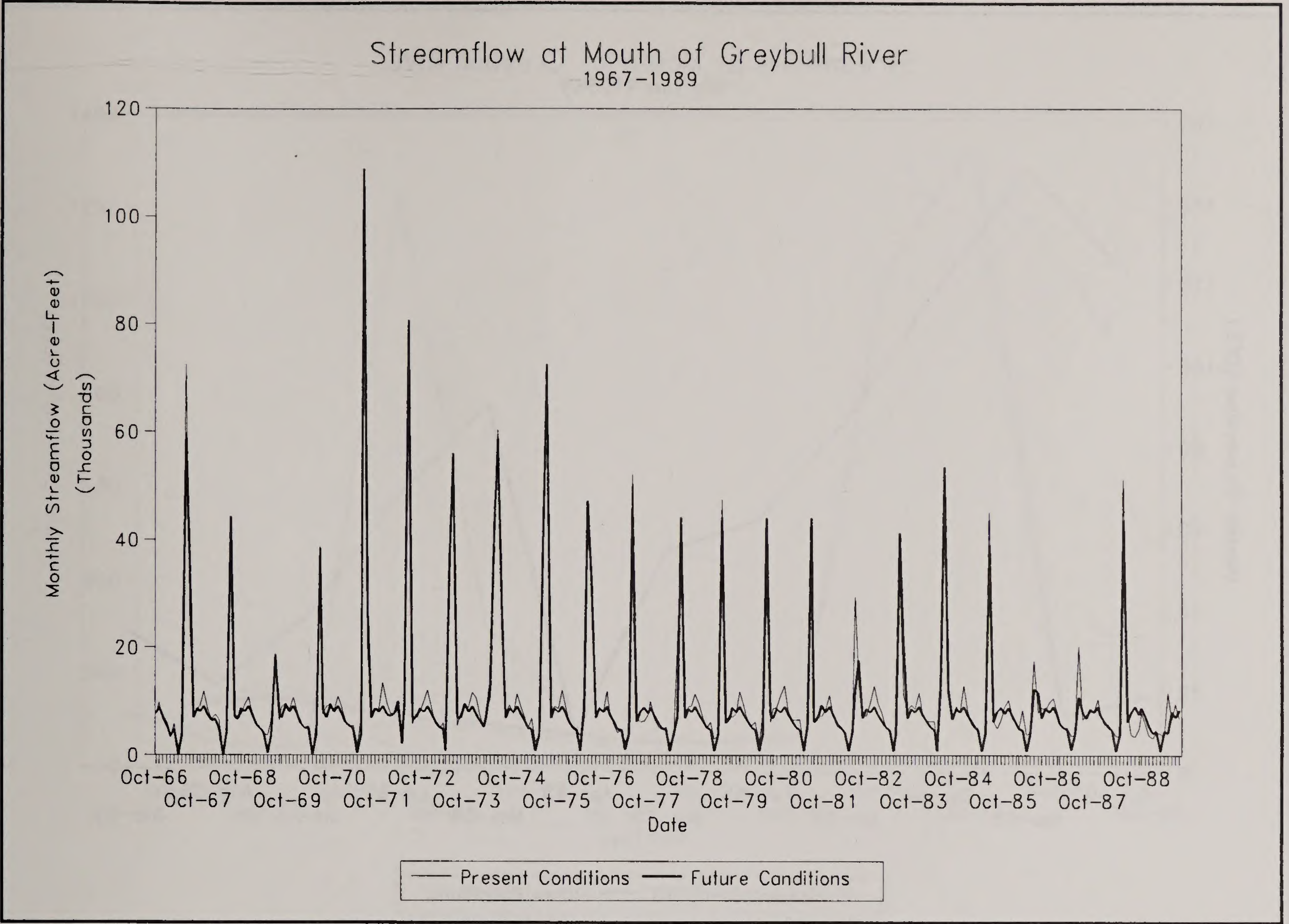


Figure 2.16 Modeled pre and post-project monthly streamflow in the Greybull River at the mouth, 1967-1989.

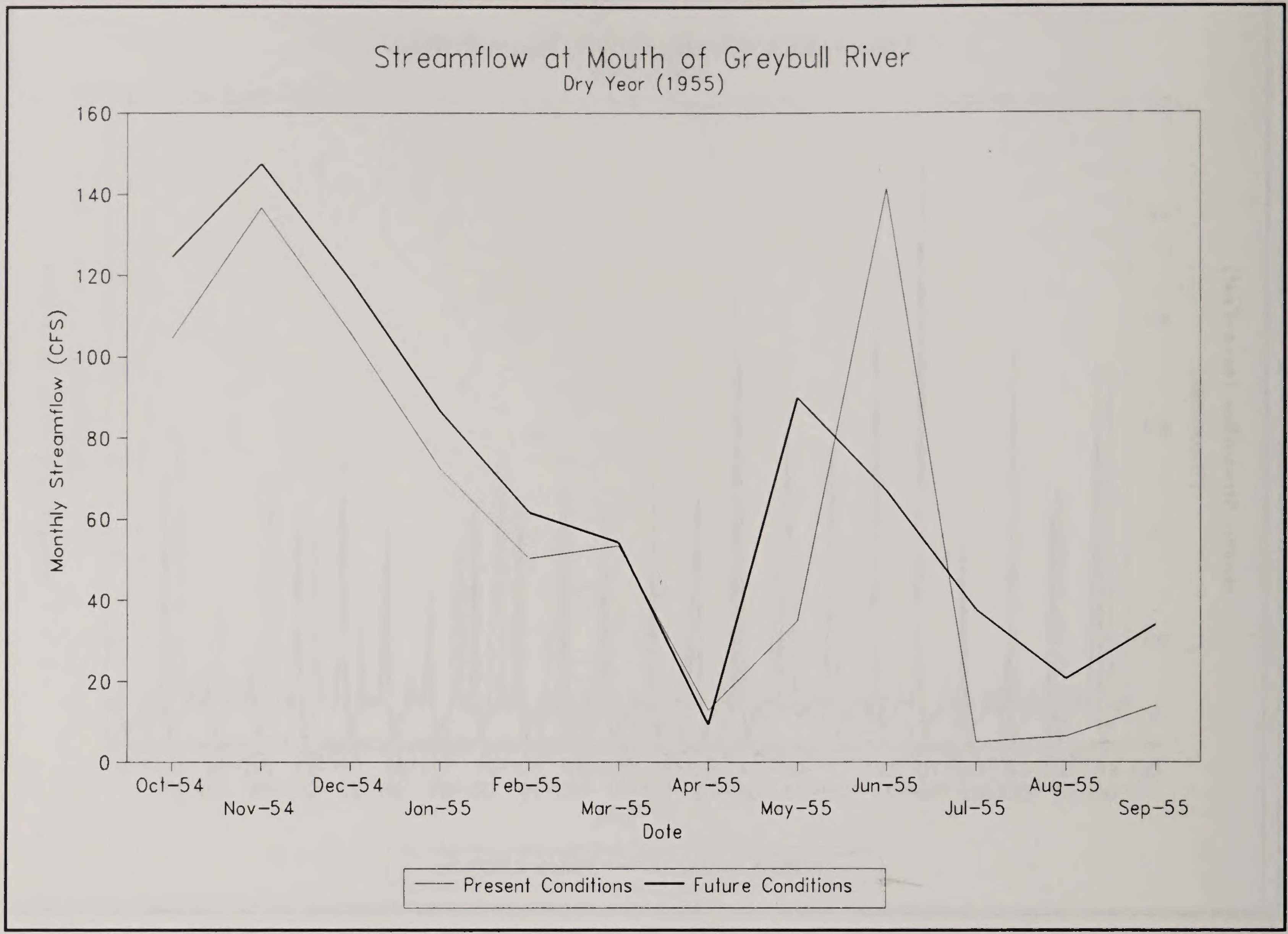


Figure 2.17 Modeled pre and post-project monthly streamflow in the Greybull River at the mouth during a typical dry year (1955).

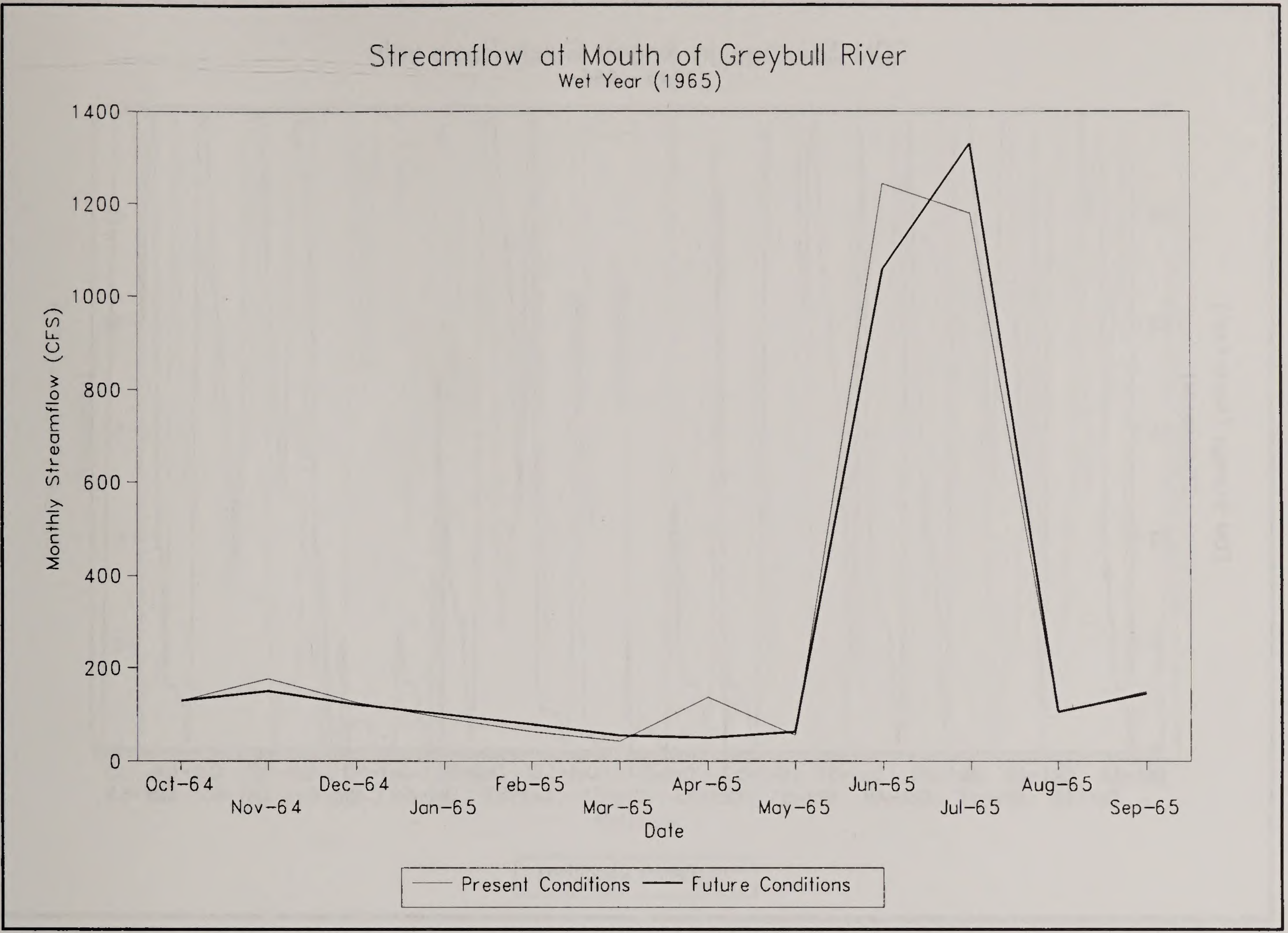


Figure 2.18 Modeled pre and post-project monthly streamflow in the Greybull River at the mouth during a typical wet year (1965).

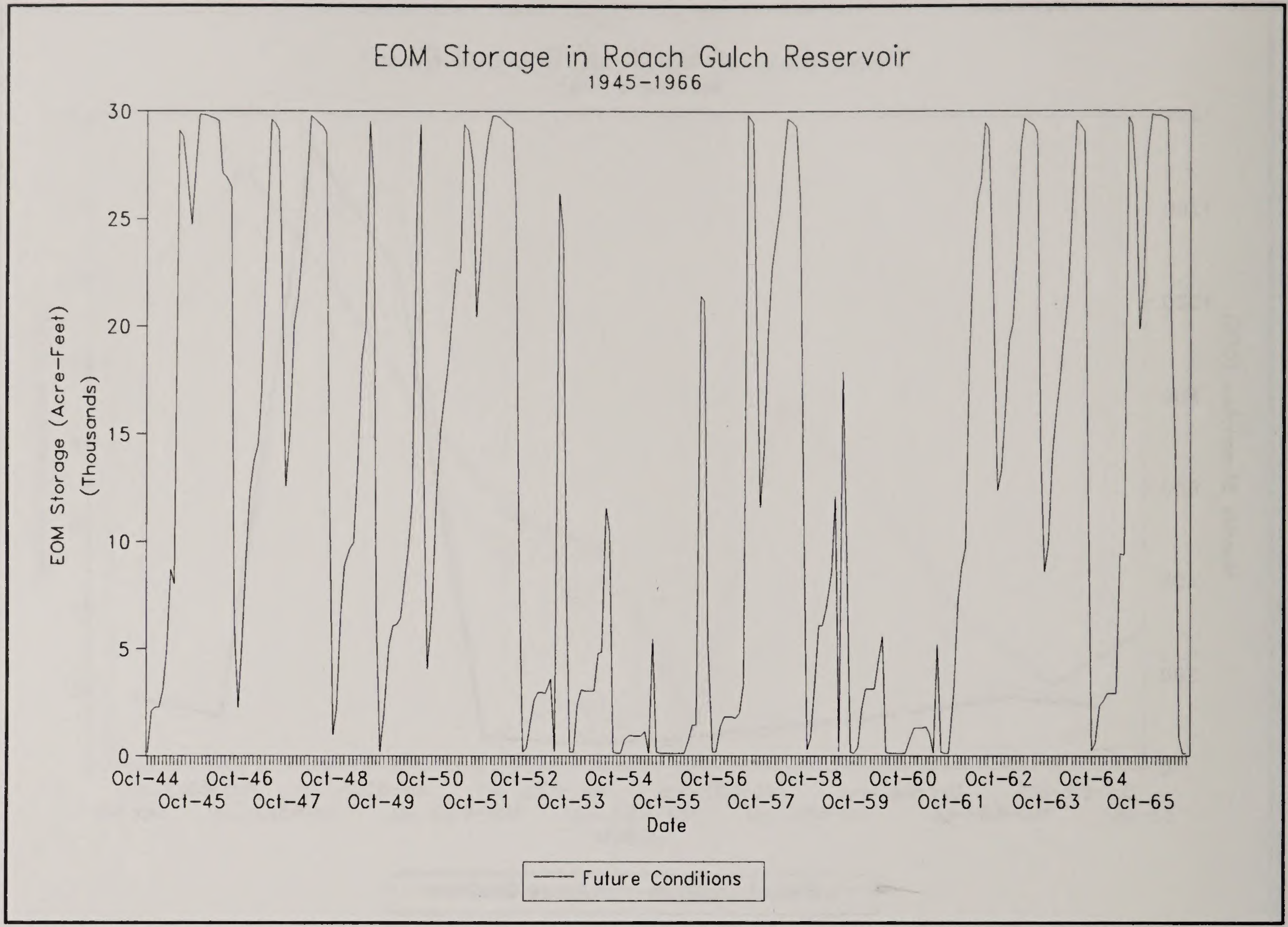


Figure 2.19 Modeled pre and post-project end-of-month storage in Lower Roach Gulch Reservoir, 1945-1966.

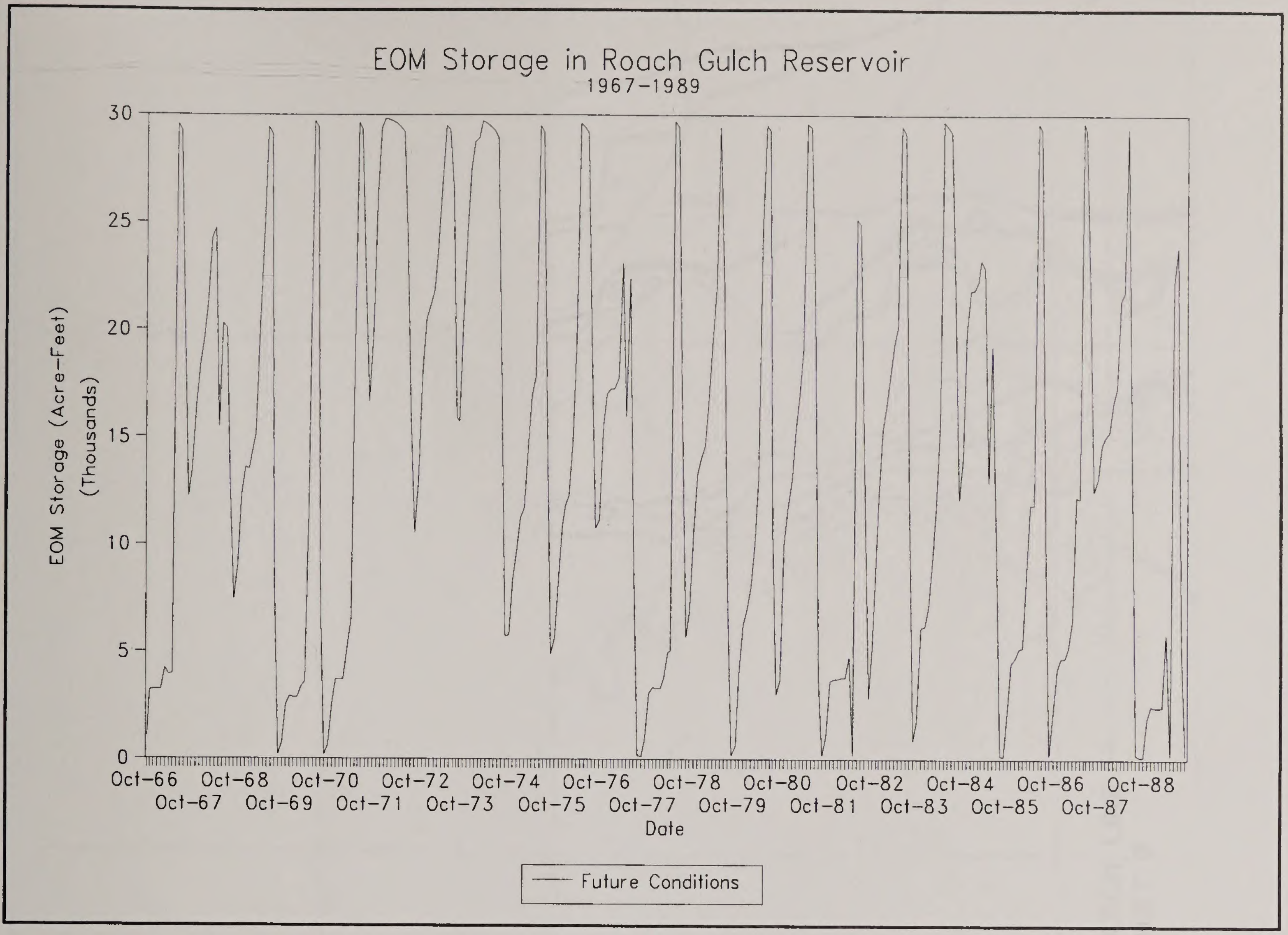
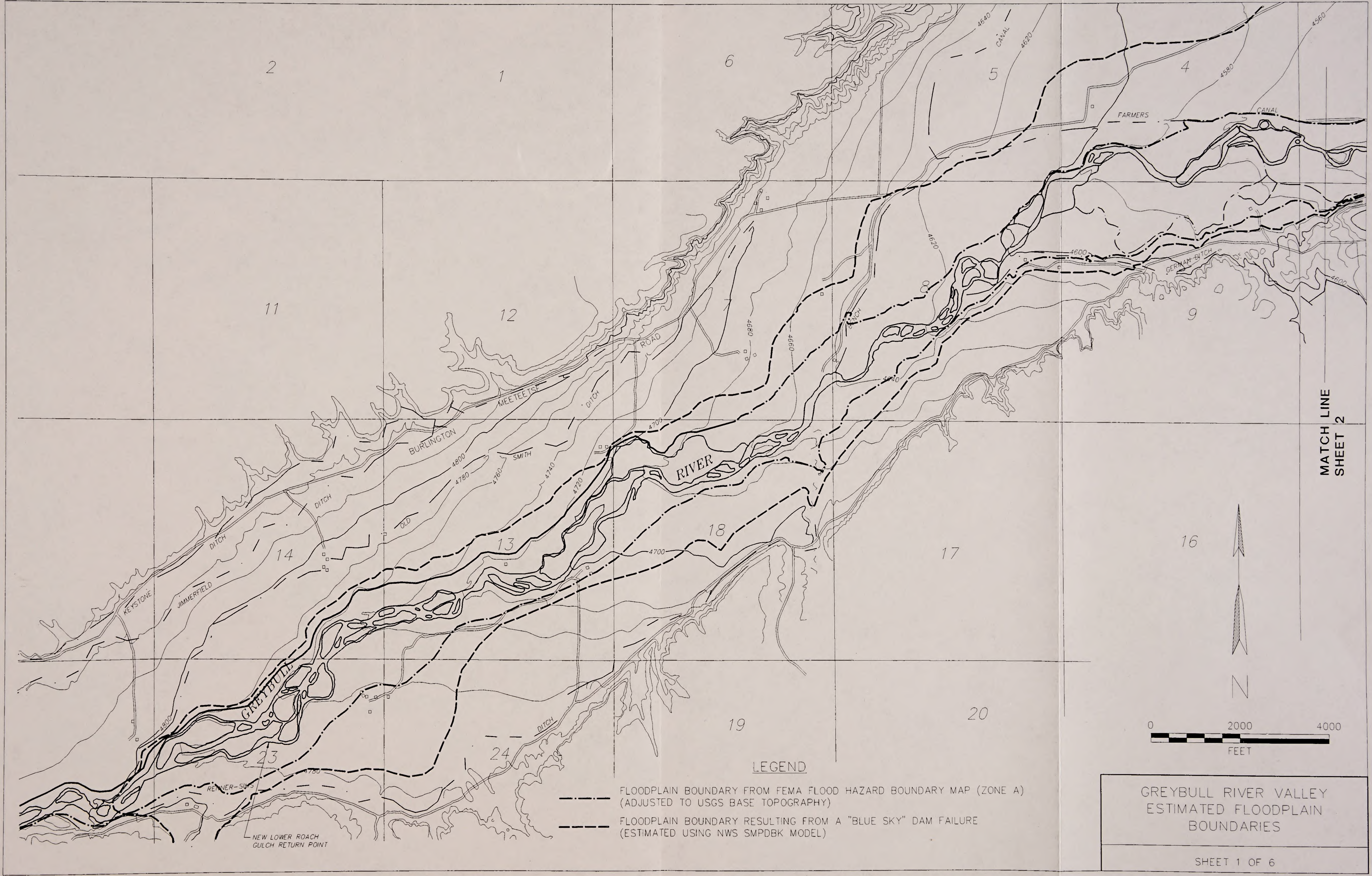


Figure 2.20 Modeled pre and post-project end-of-month storage in Lower Roach Gulch Reservoir, 1967-1989.

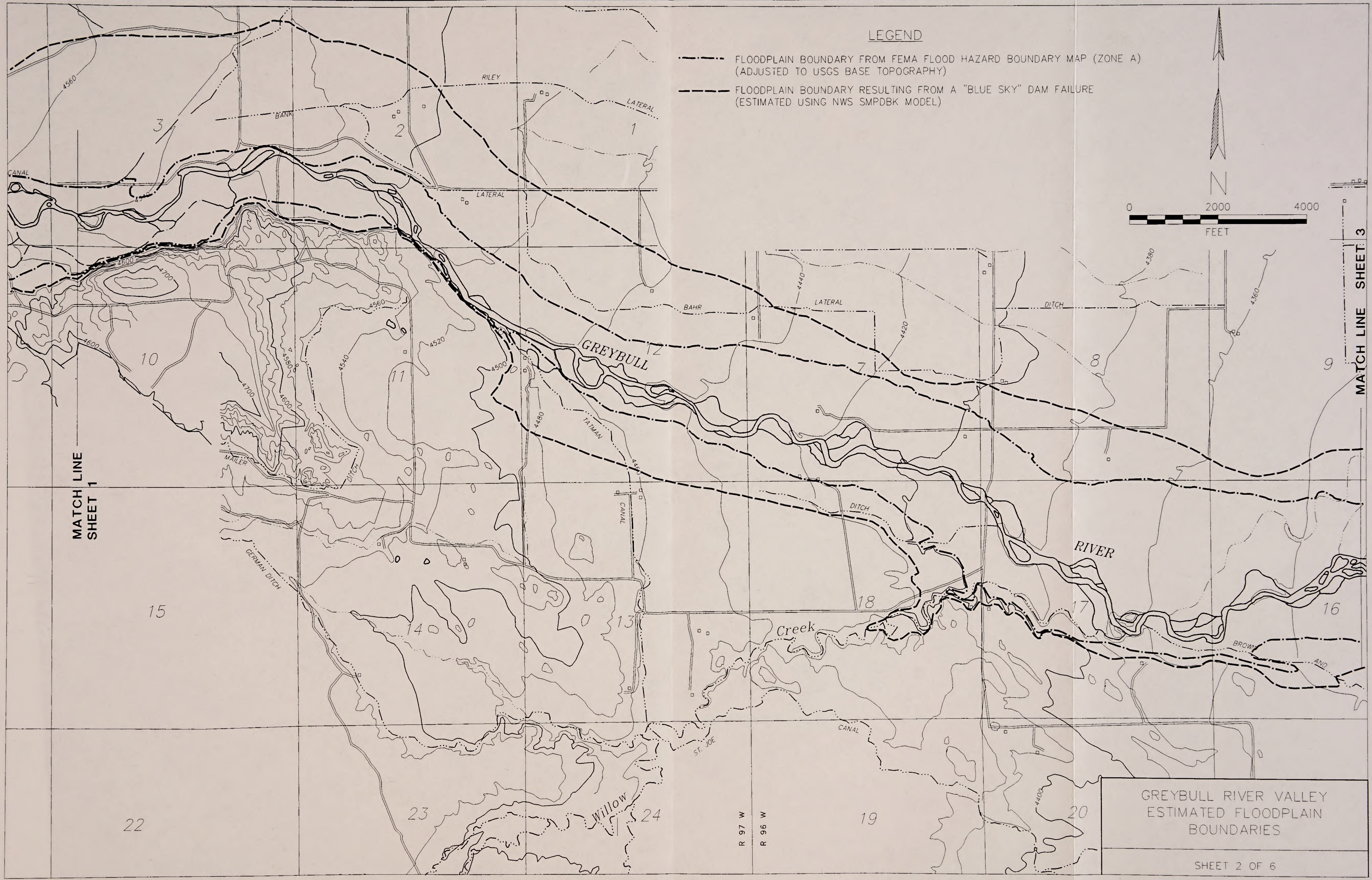


LEGEND

- — · — FLOODPLAIN BOUNDARY FROM FEMA FLOOD HAZARD BOUNDARY MAP (ZONE A) (ADJUSTED TO USGS BASE TOPOGRAPHY)
- — — — FLOODPLAIN BOUNDARY RESULTING FROM A "BLUE SKY" DAM FAILURE (ESTIMATED USING NWS SMPDBK MODEL)

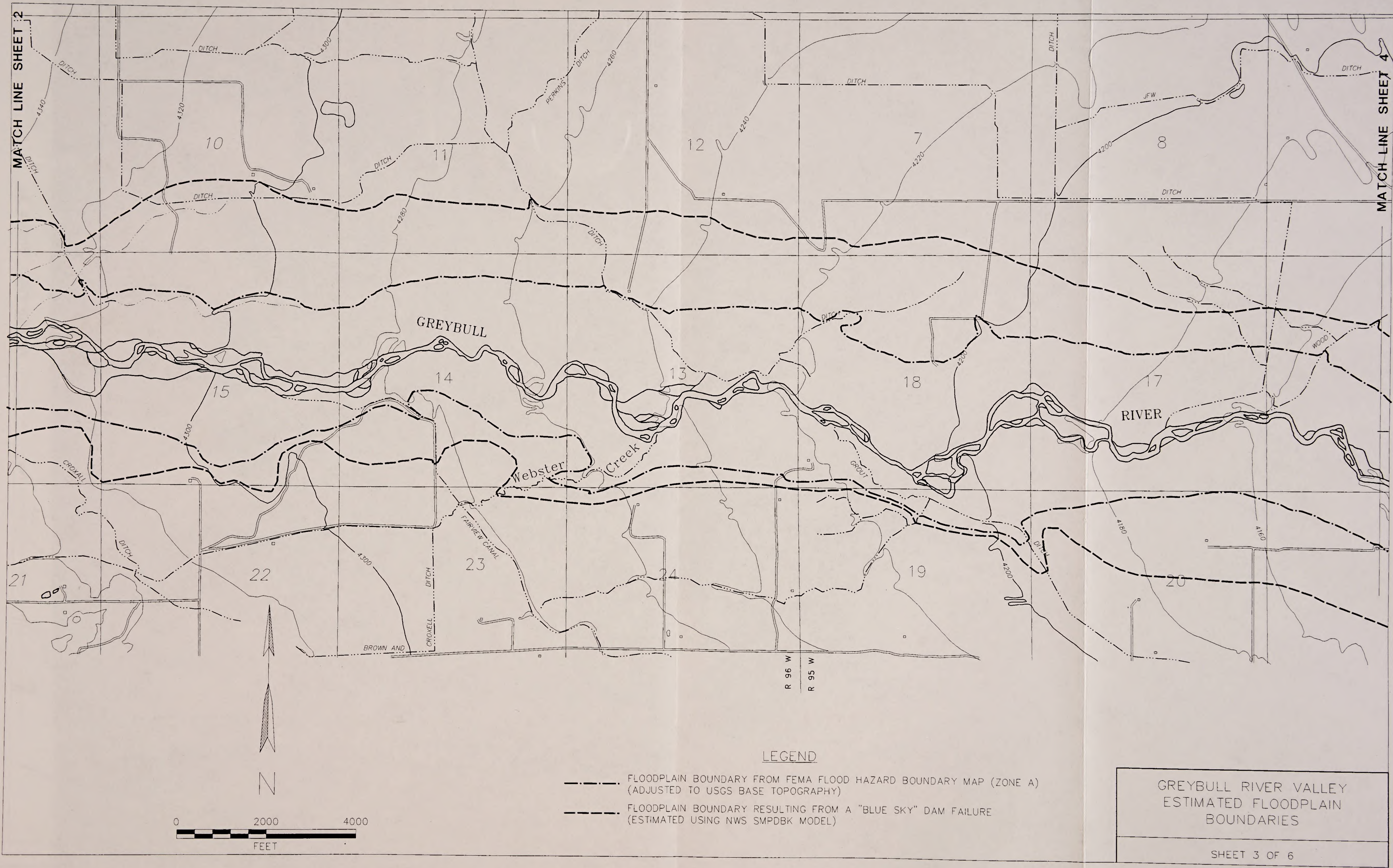
GREYBULL RIVER VALLEY
ESTIMATED FLOODPLAIN
BOUNDARIES

SHEET 1 OF 6



GREYBULL RIVER VALLEY
ESTIMATED FLOODPLAIN
BOUNDARIES

SHEET 2 OF 6


MATCH LINE SHEET 2
MATCH LINE SHEET 4
GREYBULL
RIVER
Webster
Creek
DITCH
PERKINS DITCH
JFW
WOOD
CROXALL
CROXELL
GROUT
FAIRVIEW CANAL
BROWN AND
4340
4320
4300
4280
4260
4240
4220
4200
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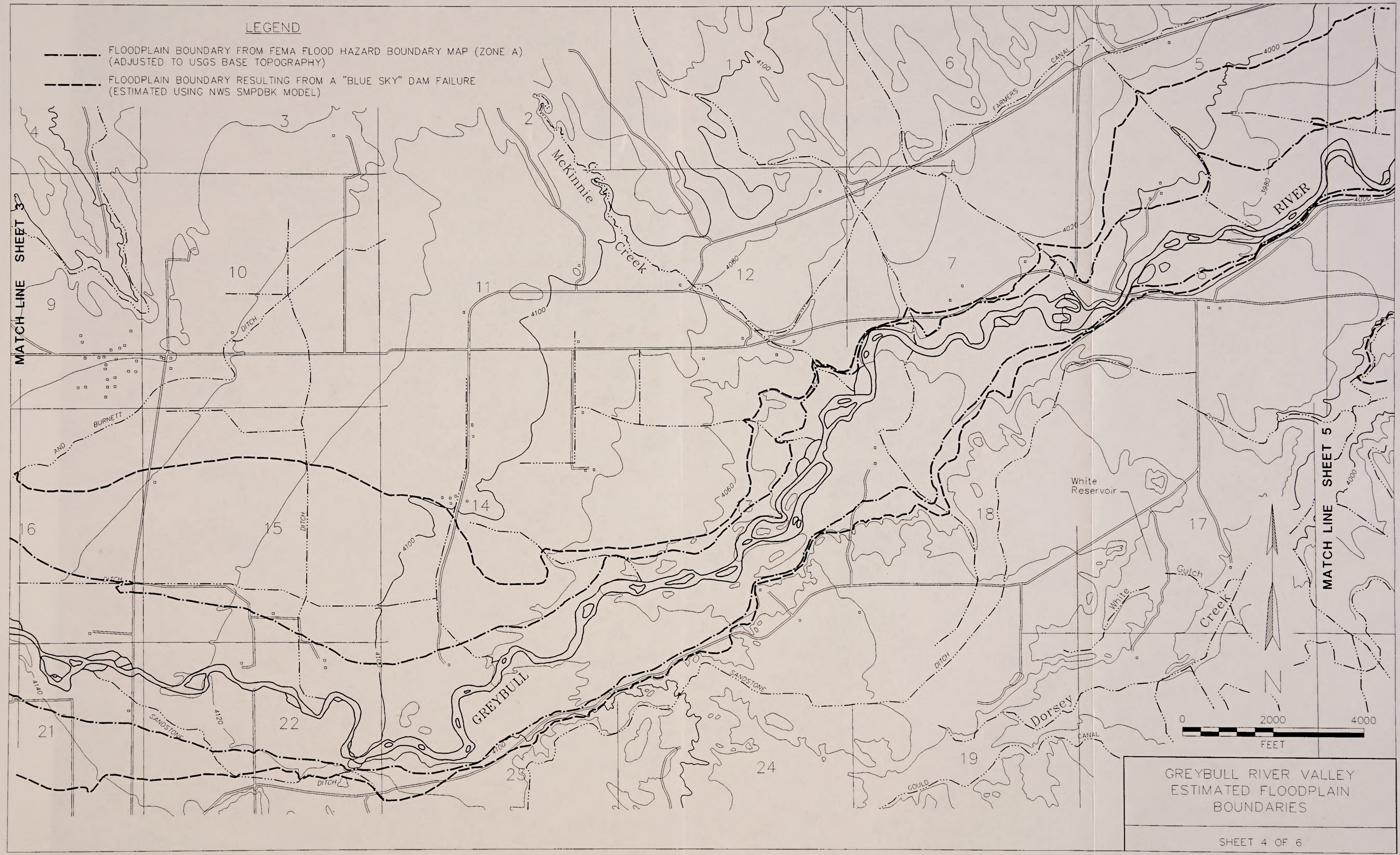
FLOODPLAIN BOUNDARY FROM FEMA FLOOD HAZARD BOUNDARY MAP (ZONE A) (ADJUSTED TO USGS BASE TOPOGRAPHY)
FLOODPLAIN BOUNDARY RESULTING FROM A "BLUE SKY" DAM FAILURE (ESTIMATED USING NWS SMPDBK MODEL)
GREYBULL RIVER VALLEY ESTIMATED FLOODPLAIN BOUNDARIES
SHEET 3 OF 6


LEGEND
FLOODPLAIN BOUNDARY FROM FEMA FLOOD HAZARD BOUNDARY MAP (ZONE A) (ADJUSTED TO USGS BASE TOPOGRAPHY)
FLOODPLAIN BOUNDARY RESULTING FROM A "BLUE SKY" DAM FAILURE (ESTIMATED USING NWS SMPDBK MODEL)
MATCH LINE SHEET 3
MATCH LINE SHEET 5
McKinnie Creek
FARMERS CANAL
RIVER
GREYBULL
BURNETT AND DITCH
DITCH
SANDSTONE DITCH
DORSEY CANAL
GOULD
White Reservoir
White Gulch
Creek
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4080
4100
4120
4140
3980
1
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3
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9
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12
14
15
16
17
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19
21
22
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24
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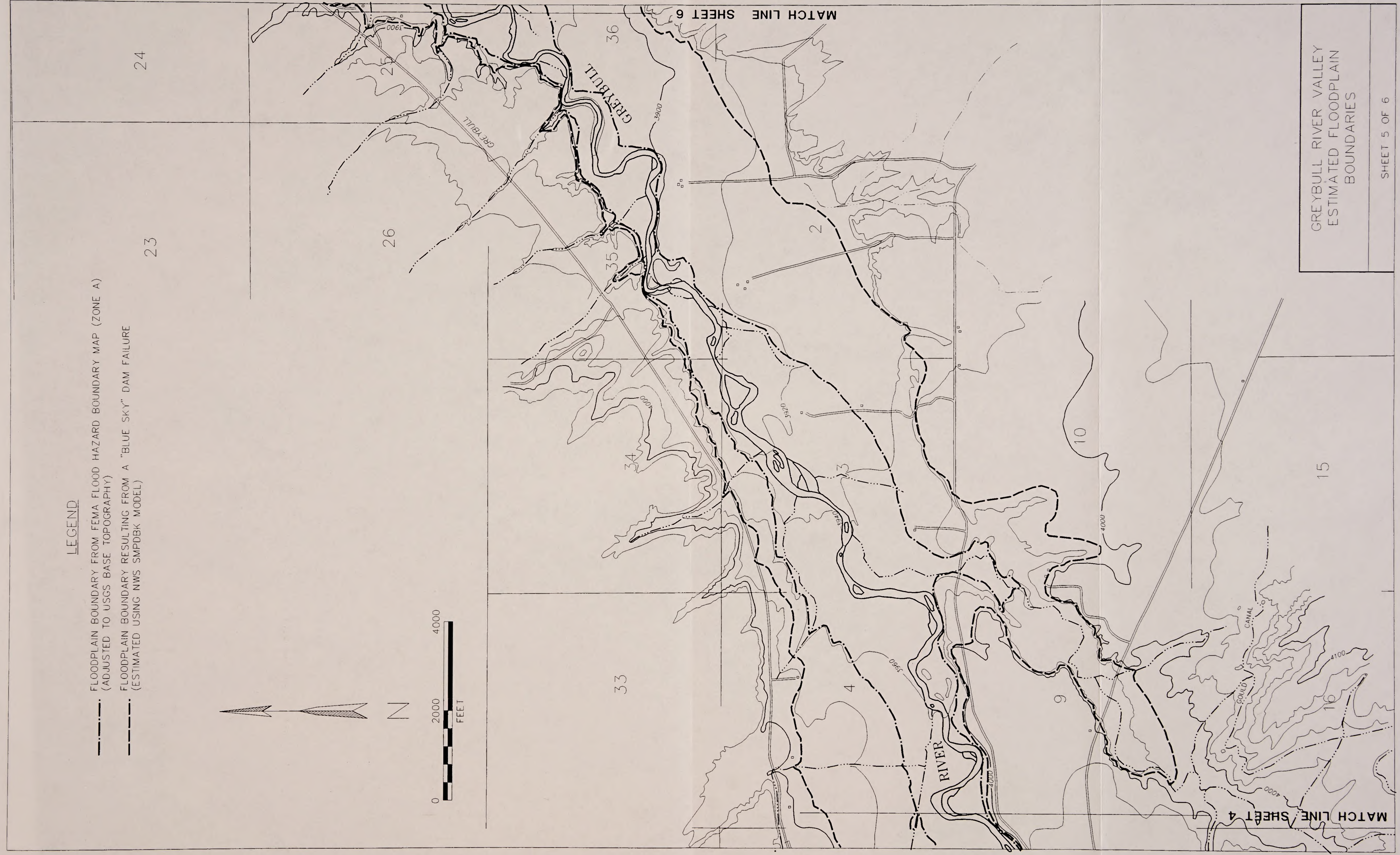
FEET
GREYBULL RIVER VALLEY
ESTIMATED FLOODPLAIN BOUNDARIES
SHEET 4 OF 6


GREYBULL RIVER VALLEY
ESTIMATED FLOODPLAIN
BOUNDARIES
SHEET 5 OF 6
LEGEND
FLOODPLAIN BOUNDARY FROM FEMA FLOOD HAZARD BOUNDARY MAP (ZONE A) (ADJUSTED TO USGS BASE TOPOGRAPHY)
FLOODPLAIN BOUNDARY RESULTING FROM A "BLUE SKY" DAM FAILURE (ESTIMATED USING NWS SMPDBK MODEL)
N
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FEET
MATCH LINE SHEET 6
MATCH LINE SHEET 4
GREYBULL
RIVER
GREYBULL
CANAL
GOULD
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25
36
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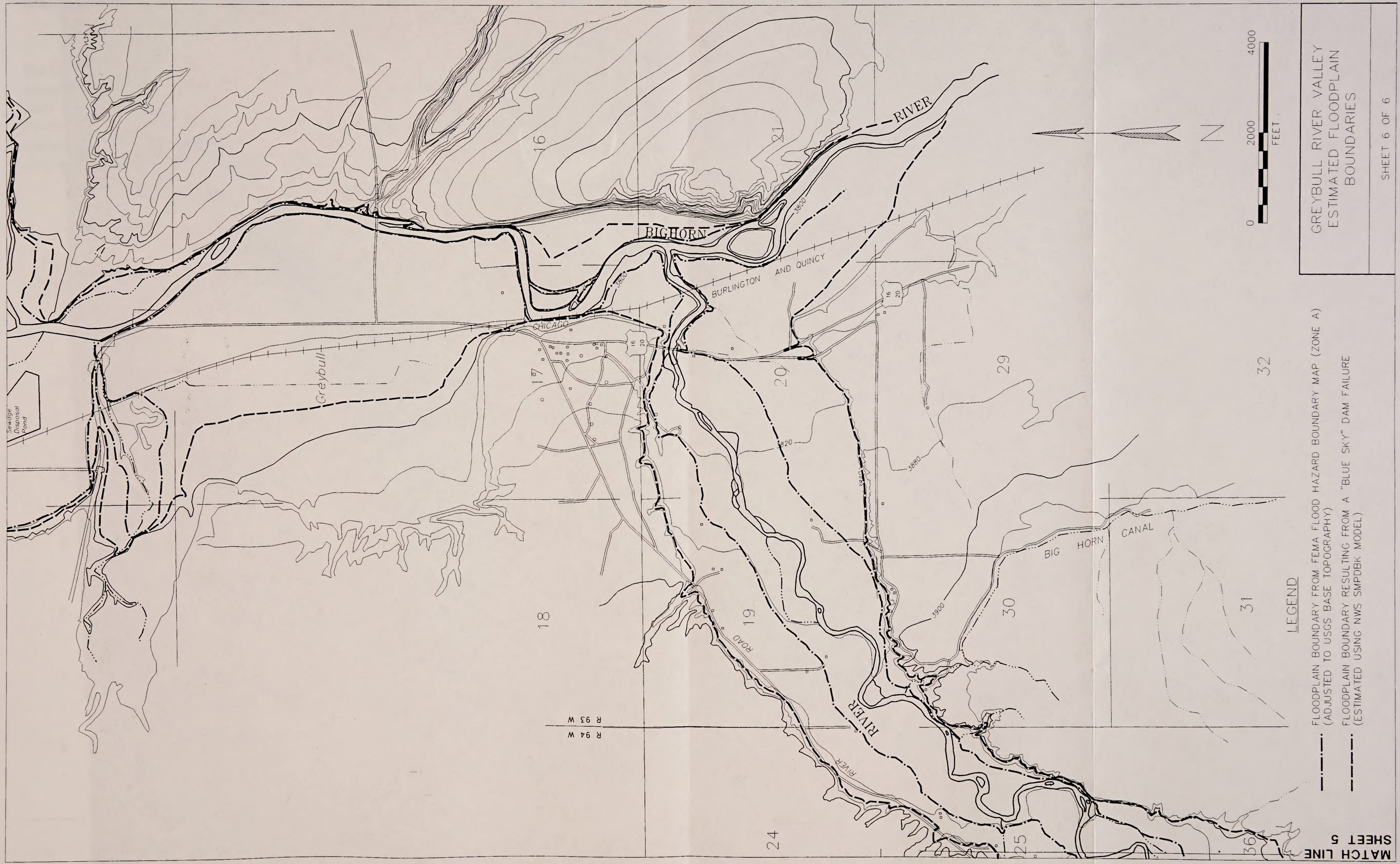
GREYBULL RIVER VALLEY
ESTIMATED FLOODPLAIN
BOUNDARIES
SHEET 6 OF 6
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LEGEND
FLOODPLAIN BOUNDARY FROM FEMA FLOOD HAZARD BOUNDARY MAP (ZONE A)
(ADJUSTED TO USGS BASE TOPOGRAPHY)
FLOODPLAIN BOUNDARY RESULTING FROM A "BLUE SKY" DAM FAILURE
(ESTIMATED USING NWS SMPDBK MODEL)
MATCH LINE
SHEET 5
BIGHORN RIVER
BURLINGTON AND QUINCY
CHICAGO
Greybull
Sewage Disposal Pond
BIG HORN CANAL
RIVER
ROAD
R 93 W
R 94 W
16
21
17
20
29
32
18
19
30
31
24
25
36
3800
3820
3840
3880
3900

CHAPTER 3.0 COMMENTS AND RESPONSES

The DEIS was sent to 265 individuals, organizations, or agencies. The BLM and Corps received 18 comment letters and one set of oral comments from the public meeting regarding the Greybull Valley Dam and Reservoir DEIS. The letters received are reproduced verbatim in the following pages. Numbers have been inserted on each letter to indicate the letter number, page, and individual comments in that letter. Responses to comments are provided by comment number to the right of each letter. Letters are listed in order of receipt.

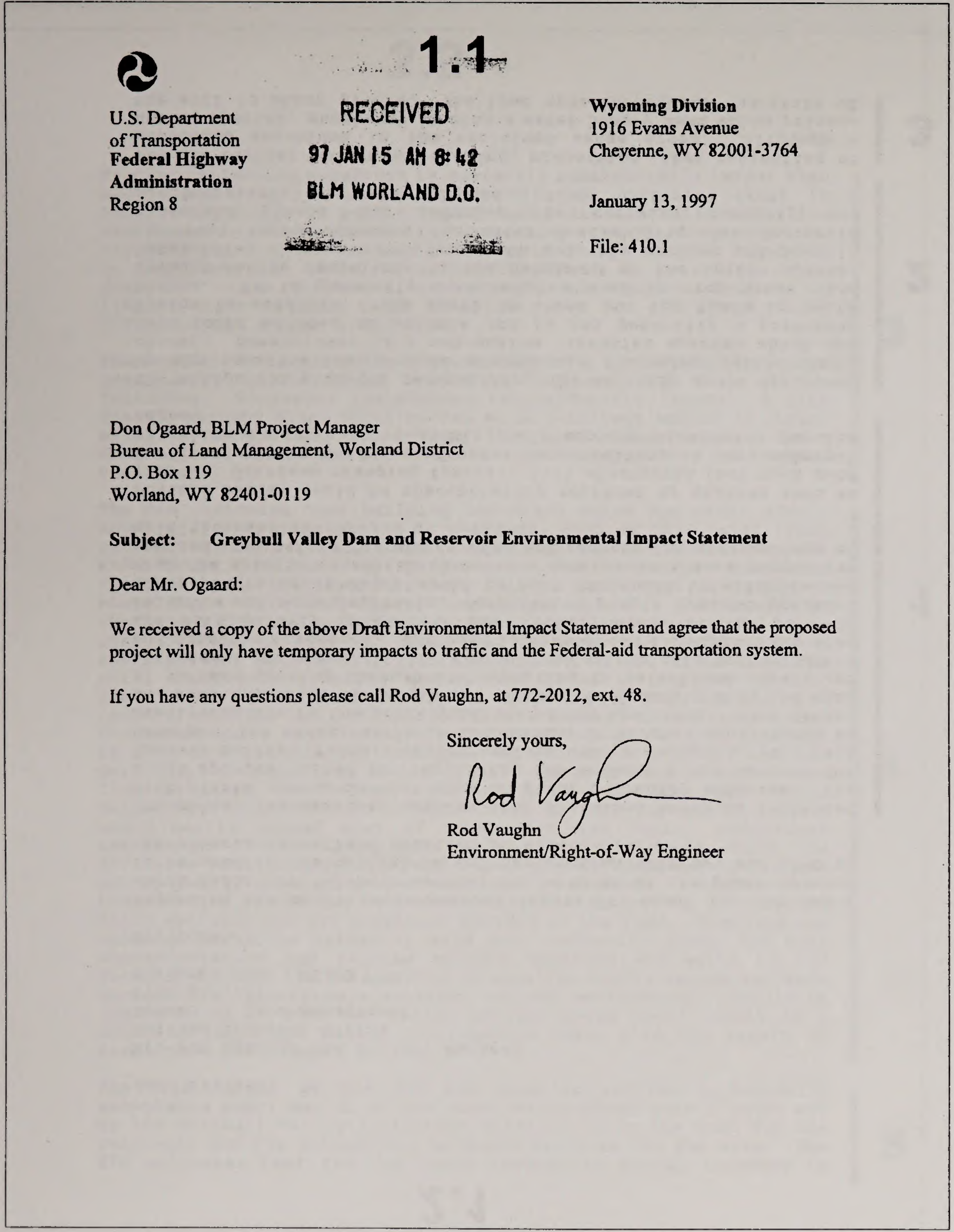
3.1 COMMENT LETTER INDEX

Letter Number	Date Received	Organization or Individual
1	1/15/97	U.S. Department of Transportation Federal Highway Administration, Wyoming Division Cheyenne, Wyoming
2	1/29/97	George Kelso Emblem, Wyoming
3	1/31/97	Farm Credit Services of the Midlands, PCA/FLCA Worland, Wyoming
4	3/6/97	U.S. Department of the Interior Bureau of Indian Affairs Billings, Montana
5	3/6/97	U.S. Department of the Interior Fish and Wildlife Service Cheyenne, Wyoming
6	3/7/97	County of Park Board of County Commissioners Cody, Wyoming
7	3/7/97	U.S. Department of Interior U.S. Geological Survey Reston, Virginia
8	3/10/97	State of Wyoming Water Development Commission Cheyenne, Wyoming

Letter Number	Date Received	Organization or Individual
9	3/10/97	U.S. Environmental Protection Agency Denver, Colorado
10	3/17/97	State of Wyoming Office of the Governor Cheyenne, Wyoming
11	3/17/97	State Land & Farm Loan Office Cheyenne, Wyoming
12	3/17/97	Wyoming Division of Cultural Resources State Historic Preservation Office Cheyenne, Wyoming
13	3/17/97	Wyoming State Geological Survey Laramie, Wyoming
14	3/17/97	Wyoming Game and Fish Department Cheyenne, Wyoming
15	3/18/97	Martin Dobson Burlington, Wyoming
16	3/18/97	Big Horn County Emergency Management Donald L. McCracken, Jr. Cowley, Wyoming
17	3/18/97	Bill Schlenker (no address)
18	3/28/97	Trout Unlimited East Yellowstone Chapter Cody, Wyoming

3.2 COMMENT LETTERS AND RESPONSES

Following are the comment letters and oral comments reproduced verbatim. Responses to individual comments are provided to the right of each letter.



1.1

RECEIVED
97 JAN 15 AM 8:42
BLM WORLAND D.O.

U.S. Department
of Transportation
**Federal Highway
Administration**
Region 8

Wyoming Division
1916 Evans Avenue
Cheyenne, WY 82001-3764

January 13, 1997

File: 410.1

Don Ogaard, BLM Project Manager
Bureau of Land Management, Worland District
P.O. Box 119
Worland, WY 82401-0119

Subject: **Greybull Valley Dam and Reservoir Environmental Impact Statement**

Dear Mr. Ogaard:

We received a copy of the above Draft Environmental Impact Statement and agree that the proposed project will only have temporary impacts to traffic and the Federal-aid transportation system.

If you have any questions please call Rod Vaughn, at 772-2012, ext. 48.

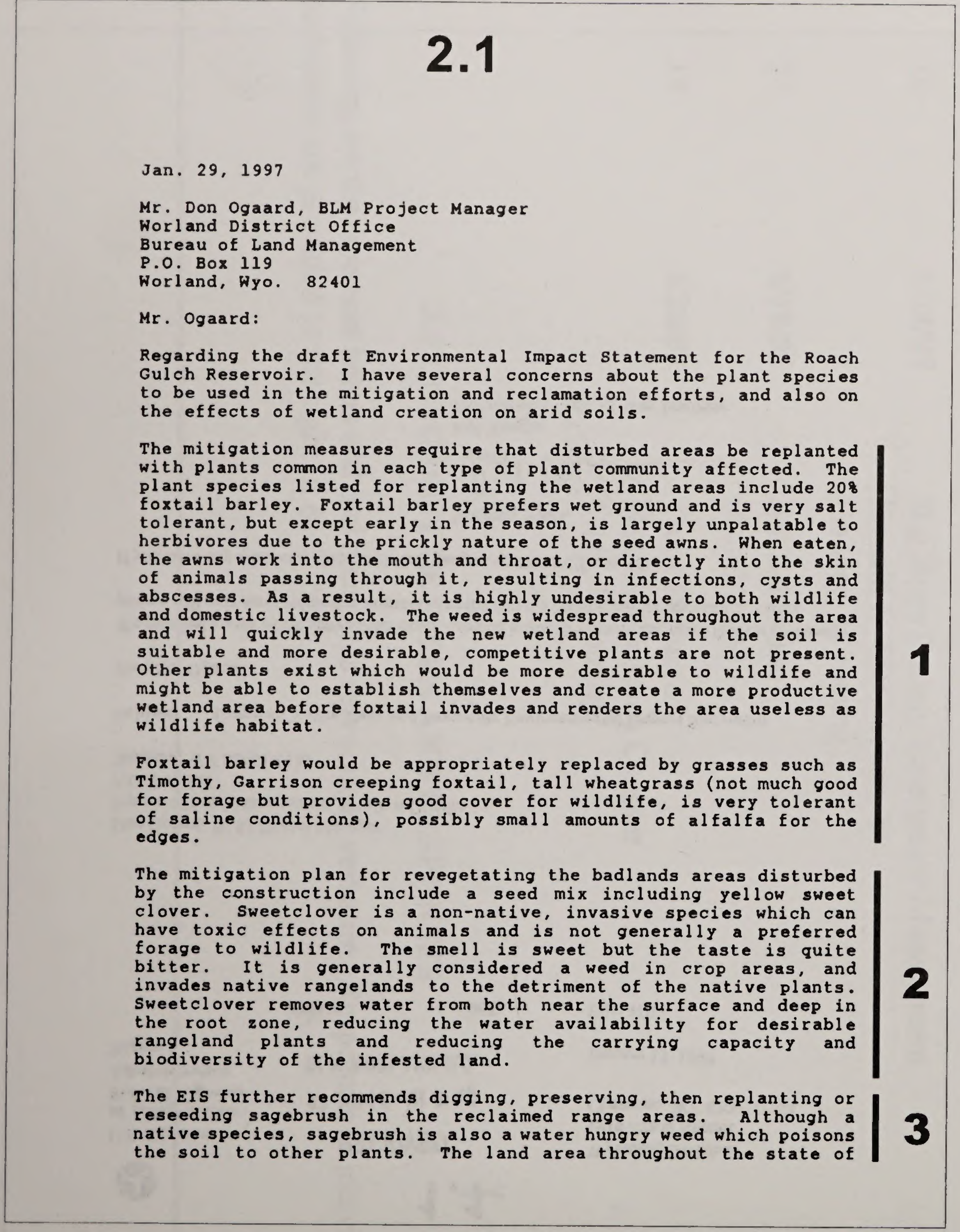
Sincerely yours,

Rod Vaughn

Rod Vaughn
Environment/Right-of-Way Engineer

Letter 1
USDOT, Federal Highway Administration - January 13, 1997

Thank you for your comments.



2.1

Jan. 29, 1997

Mr. Don Ogaard, BLM Project Manager
Worland District Office
Bureau of Land Management
P.O. Box 119
Worland, Wyo. 82401

Mr. Ogaard:

Regarding the draft Environmental Impact Statement for the Roach Gulch Reservoir. I have several concerns about the plant species to be used in the mitigation and reclamation efforts, and also on the effects of wetland creation on arid soils.

The mitigation measures require that disturbed areas be replanted with plants common in each type of plant community affected. The plant species listed for replanting the wetland areas include 20% foxtail barley. Foxtail barley prefers wet ground and is very salt tolerant, but except early in the season, is largely unpalatable to herbivores due to the prickly nature of the seed awns. When eaten, the awns work into the mouth and throat, or directly into the skin of animals passing through it, resulting in infections, cysts and abscesses. As a result, it is highly undesirable to both wildlife and domestic livestock. The weed is widespread throughout the area and will quickly invade the new wetland areas if the soil is suitable and more desirable, competitive plants are not present. Other plants exist which would be more desirable to wildlife and might be able to establish themselves and create a more productive wetland area before foxtail invades and renders the area useless as wildlife habitat.

Foxtail barley would be appropriately replaced by grasses such as Timothy, Garrison creeping foxtail, tall wheatgrass (not much good for forage but provides good cover for wildlife, is very tolerant of saline conditions), possibly small amounts of alfalfa for the edges. **1**

The mitigation plan for revegetating the badlands areas disturbed by the construction include a seed mix including yellow sweet clover. Sweetclover is a non-native, invasive species which can have toxic effects on animals and is not generally a preferred forage to wildlife. The smell is sweet but the taste is quite bitter. It is generally considered a weed in crop areas, and invades native rangelands to the detriment of the native plants. Sweetclover removes water from both near the surface and deep in the root zone, reducing the water availability for desirable rangeland plants and reducing the carrying capacity and biodiversity of the infested land. **2**

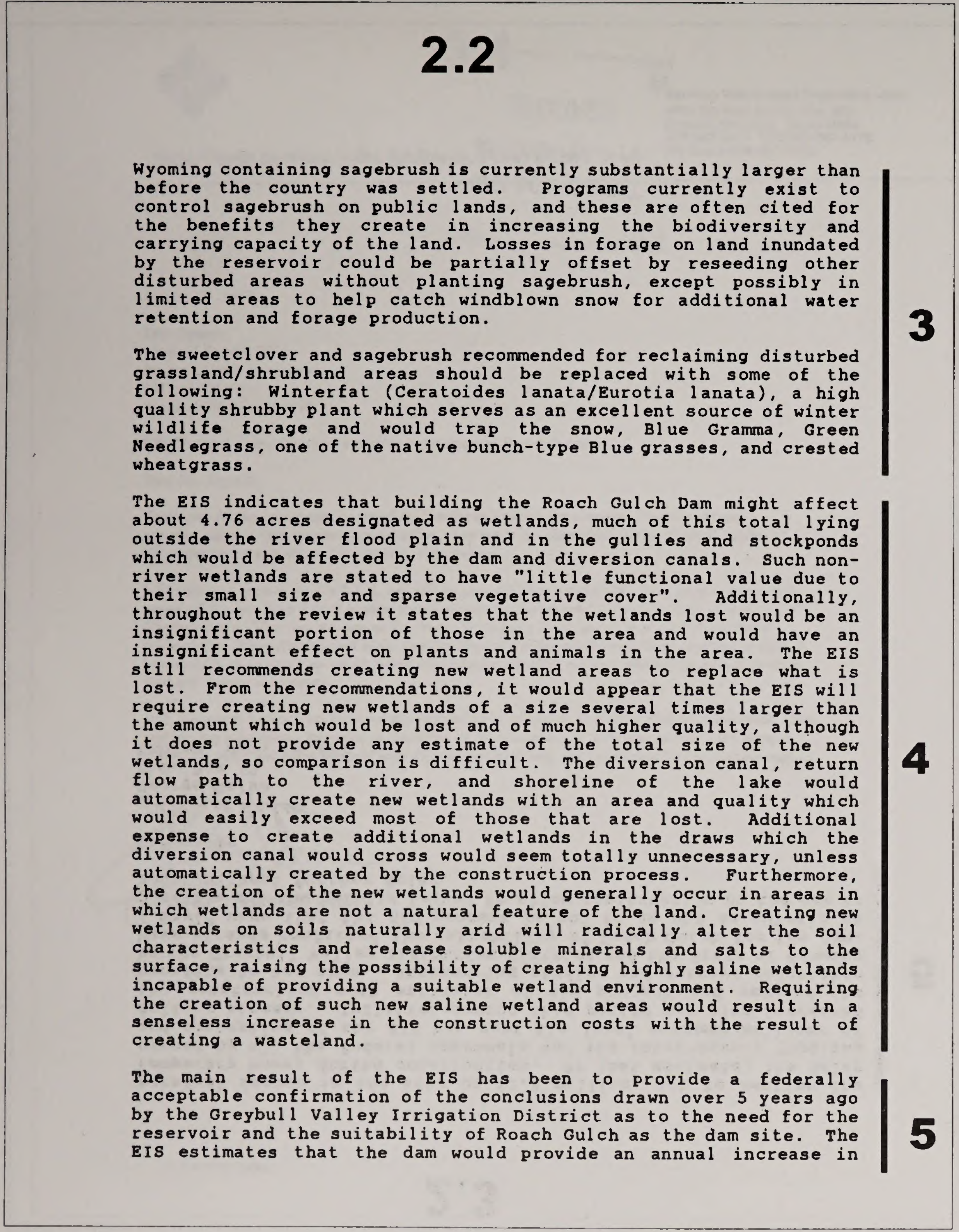
The EIS further recommends digging, preserving, then replanting or reseeding sagebrush in the reclaimed range areas. Although a native species, sagebrush is also a water hungry weed which poisons the soil to other plants. The land area throughout the state of **3**

Letter 2
George Kelso - January 29, 1997

1. The BLM reclamation policy recommends using plant species common in the project area, which was the basis for the list provided in the DEIS. The recommended plant list for reclamation has been changed (see CHAPTER 2.0 ADDITIONS AND ERRATA). The GVID will be provided the new list for their plan of development (POD).

2. Yellow sweet clover has been eliminated from the reclamation plant list.

3. BLM reclamation policy recommends returning disturbed areas to pre-disturbance conditions as quickly as possible. Big sagebrush is a native plant which is common throughout the project area. Big sagebrush will be seeded and/or planted in areas where it is common prior to construction activity. Sagebrush is not toxic to other plants and often improves snow retention in shortgrass prairie habitats. Additionally, sagebrush is critical to many species of wildlife such as sage grouse, increasing the biodiversity of an area.



2.2

Wyoming containing sagebrush is currently substantially larger than before the country was settled. Programs currently exist to control sagebrush on public lands, and these are often cited for the benefits they create in increasing the biodiversity and carrying capacity of the land. Losses in forage on land inundated by the reservoir could be partially offset by reseeding other disturbed areas without planting sagebrush, except possibly in limited areas to help catch windblown snow for additional water retention and forage production.

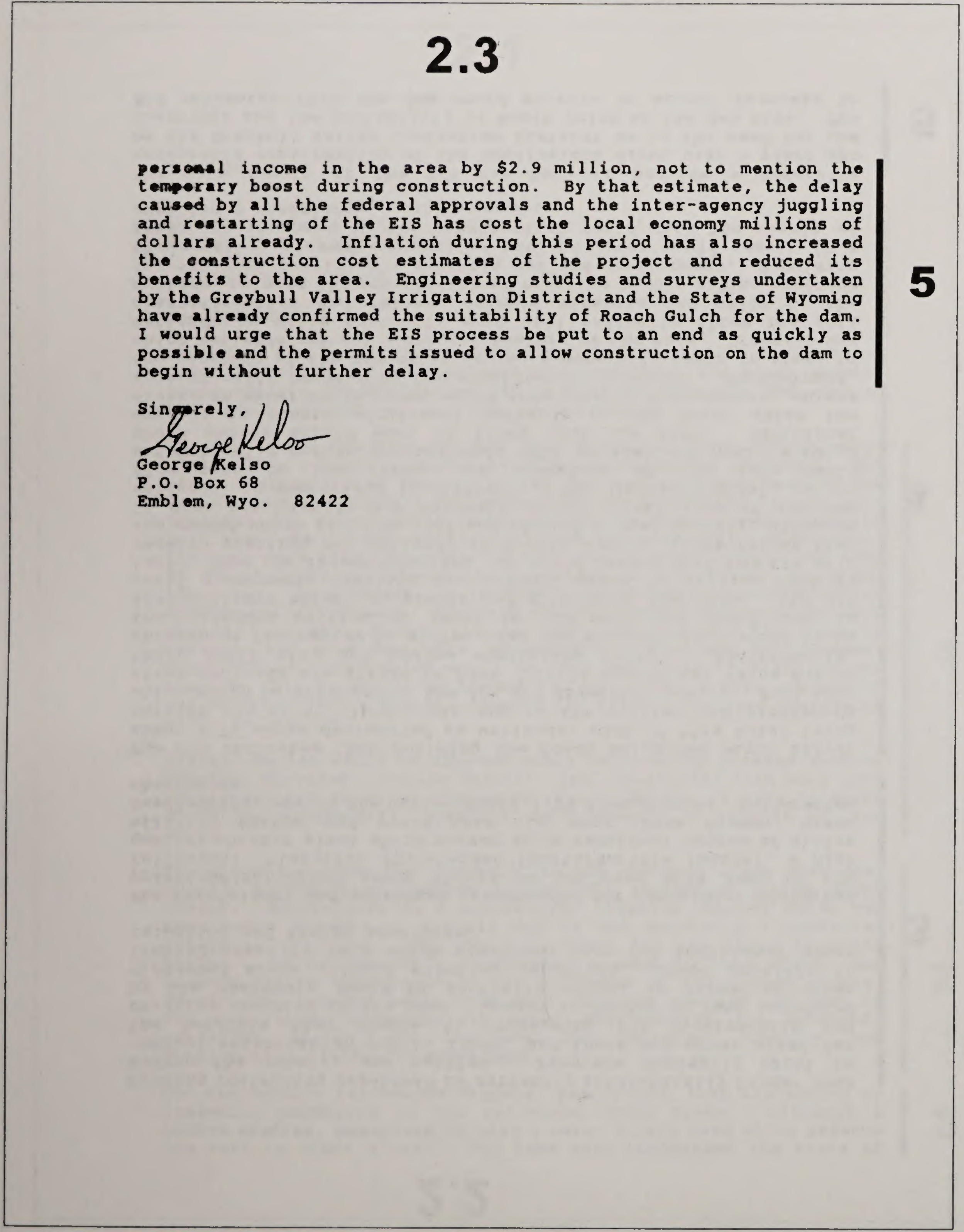
The sweetclover and sagebrush recommended for reclaiming disturbed grassland/shrubland areas should be replaced with some of the following: Winterfat (Ceratoides lanata/Eurotia lanata), a high quality shrubby plant which serves as an excellent source of winter wildlife forage and would trap the snow, Blue Gramma, Green Needlegrass, one of the native bunch-type Blue grasses, and crested wheatgrass. **3**

The EIS indicates that building the Roach Gulch Dam might affect about 4.76 acres designated as wetlands, much of this total lying outside the river flood plain and in the gullies and stockponds which would be affected by the dam and diversion canals. Such non-river wetlands are stated to have "little functional value due to their small size and sparse vegetative cover". Additionally, throughout the review it states that the wetlands lost would be an insignificant portion of those in the area and would have an insignificant effect on plants and animals in the area. The EIS still recommends creating new wetland areas to replace what is lost. From the recommendations, it would appear that the EIS will require creating new wetlands of a size several times larger than the amount which would be lost and of much higher quality, although it does not provide any estimate of the total size of the new wetlands, so comparison is difficult. The diversion canal, return flow path to the river, and shoreline of the lake would automatically create new wetlands with an area and quality which would easily exceed most of those that are lost. Additional expense to create additional wetlands in the draws which the diversion canal would cross would seem totally unnecessary, unless automatically created by the construction process. Furthermore, the creation of the new wetlands would generally occur in areas in which wetlands are not a natural feature of the land. Creating new wetlands on soils naturally arid will radically alter the soil characteristics and release soluble minerals and salts to the surface, raising the possibility of creating highly saline wetlands incapable of providing a suitable wetland environment. Requiring the creation of such new saline wetland areas would result in a senseless increase in the construction costs with the result of creating a wasteland. **4**

The main result of the EIS has been to provide a federally acceptable confirmation of the conclusions drawn over 5 years ago by the Greybull Valley Irrigation District as to the need for the reservoir and the suitability of Roach Gulch as the dam site. The EIS estimates that the dam would provide an annual increase in **5**

4. Wetlands are protected by the CWA and mitigation for wetland losses is required by federal law. As identified in Section 4.6 BIOLOGICAL RESOURCES, wetland replacement will be in areas with appropriate soils and preferably in the Greybull River floodplain. The final wetland mitigation site(s) and the number of acres required will be identified as part of the 404 permit from the Corps. Mitigation will replace the high quality wetlands impacted within the floodplain. Additional, lower quality wetlands may develop incidental to the project's redistribution of water.

5. The EIS is required by NEPA because of the use of public resources. The final decision on which alternative is approved will be contained in the Record of Decision (ROD) by the BLM and 404 permit issued by the Corps. In addition to evaluating the environmental effects of project alternatives and providing public disclosure of the effects, the EIS process also identifies mitigation measures necessary to reduce potential effects. The process will continue to completion.



2.3

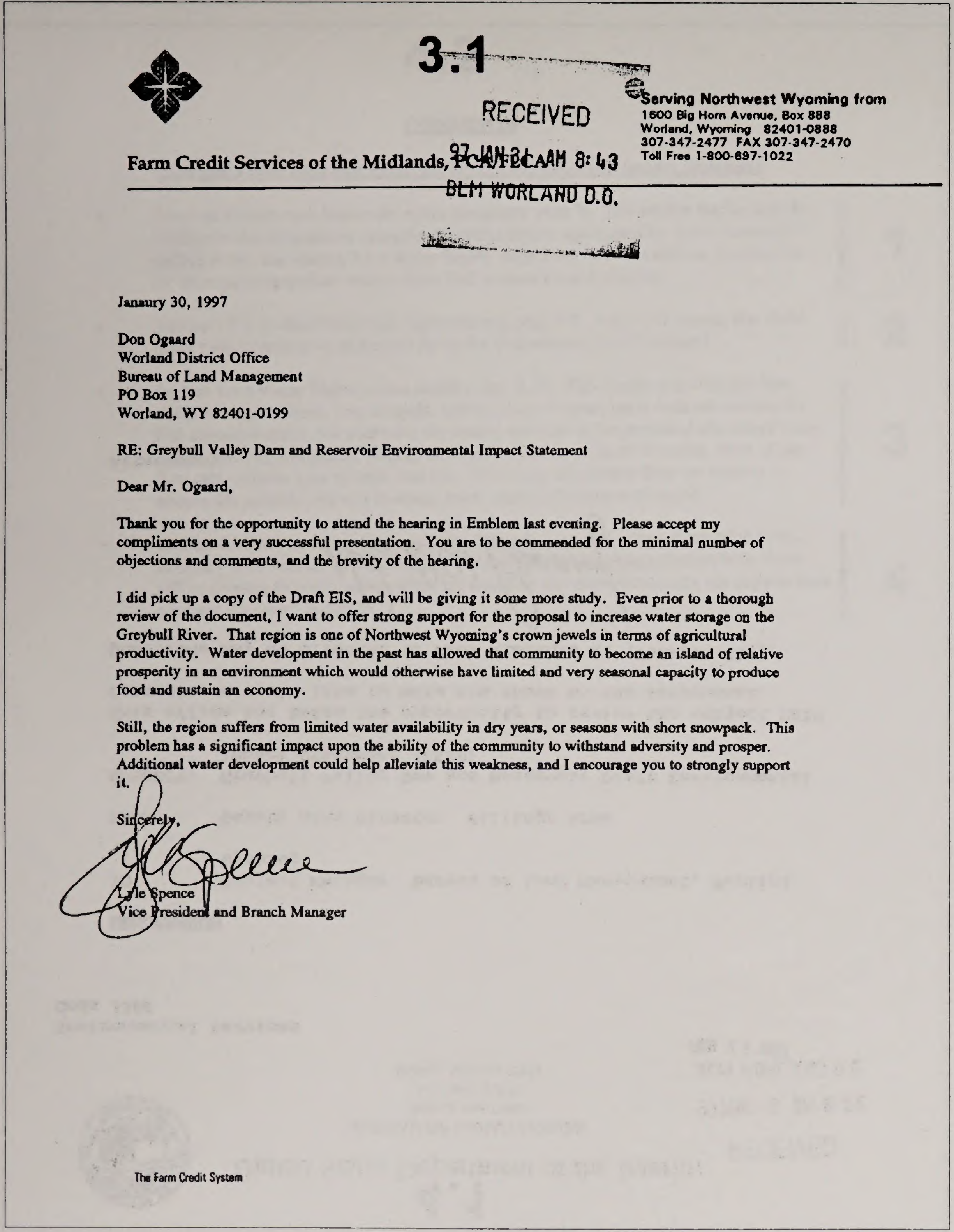
personal income in the area by $2.9 million, not to mention the temporary boost during construction. By that estimate, the delay caused by all the federal approvals and the inter-agency juggling and restarting of the EIS has cost the local economy millions of dollars already. Inflation during this period has also increased the construction cost estimates of the project and reduced its benefits to the area. Engineering studies and surveys undertaken by the Greybull Valley Irrigation District and the State of Wyoming have already confirmed the suitability of Roach Gulch for the dam. I would urge that the EIS process be put to an end as quickly as possible and the permits issued to allow construction on the dam to begin without further delay. 5

Sincerely,

George Kelso

George Kelso
P.O. Box 68
Emblem, Wyo. 82422

Letter 3
Farm Credit Services of the Midlands - January 30, 1997



3.1

RECEIVED
97 JAN 31 AM 8:43
BLM WORLAND D.O.

Farm Credit Services of the Midlands, PCA/FLCA

Serving Northwest Wyoming from
1600 Big Horn Avenue, Box 888
Worland, Wyoming 82401-0888
307-347-2477 FAX 307-347-2470
Toll Free 1-800-697-1022

Janaury 30, 1997

Don Ogaard
Worland District Office
Bureau of Land Management
PO Box 119
Worland, WY 82401-0199

RE: Greybull Valley Dam and Reservoir Environmental Impact Statement

Dear Mr. Ogaard,

Thank you for the opportunity to attend the hearing in Emblem last evening. Please accept my compliments on a very successful presentation. You are to be commended for the minimal number of objections and comments, and the brevity of the hearing.

I did pick up a copy of the Draft EIS, and will be giving it some more study. Even prior to a thorough review of the document, I want to offer strong support for the proposal to increase water storage on the Greybull River. That region is one of Northwest Wyoming's crown jewels in terms of agricultural productivity. Water development in the past has allowed that community to become an island of relative prosperity in an environment which would otherwise have limited and very seasonal capacity to produce food and sustain an economy.

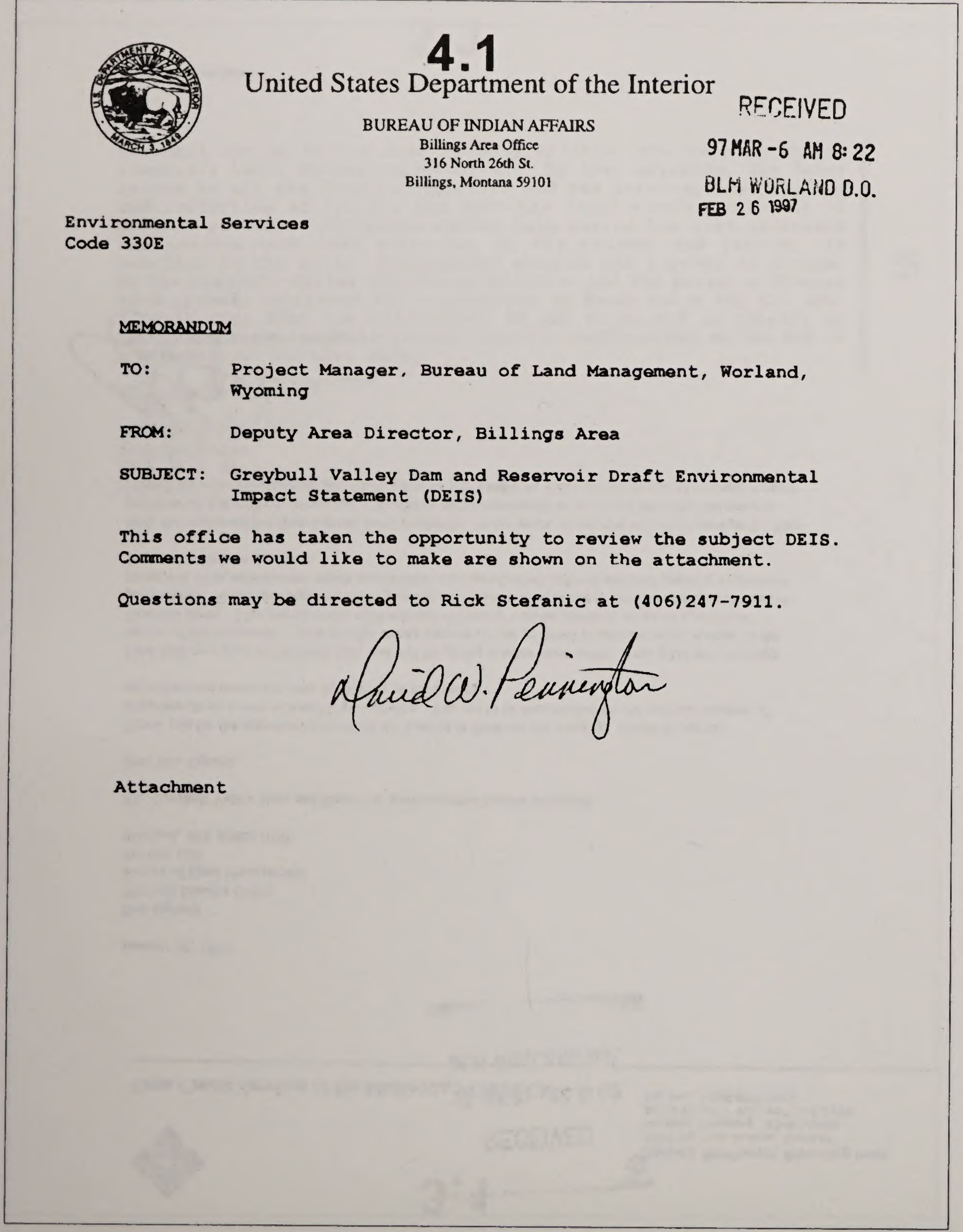
Still, the region suffers from limited water availability in dry years, or seasons with short snowpack. This problem has a significant impact upon the ability of the community to withstand adversity and prosper. Additional water development could help alleviate this weakness, and I encourage you to strongly support it.

Sincerely,

Lyle Spence
Vice President and Branch Manager

The Farm Credit System

Thank you for your comments.



4.1

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Billings Area Office
316 North 26th St.
Billings, Montana 59101

RECEIVED
97 MAR -6 AM 8:22
BLM WORLAND D.O.

FEB 26 1997

Environmental Services
Code 330E

MEMORANDUM

TO: Project Manager, Bureau of Land Management, Worland, Wyoming

FROM: Deputy Area Director, Billings Area

SUBJECT: Greybull Valley Dam and Reservoir Draft Environmental Impact Statement (DEIS)

This office has taken the opportunity to review the subject DEIS. Comments we would like to make are shown on the attachment.

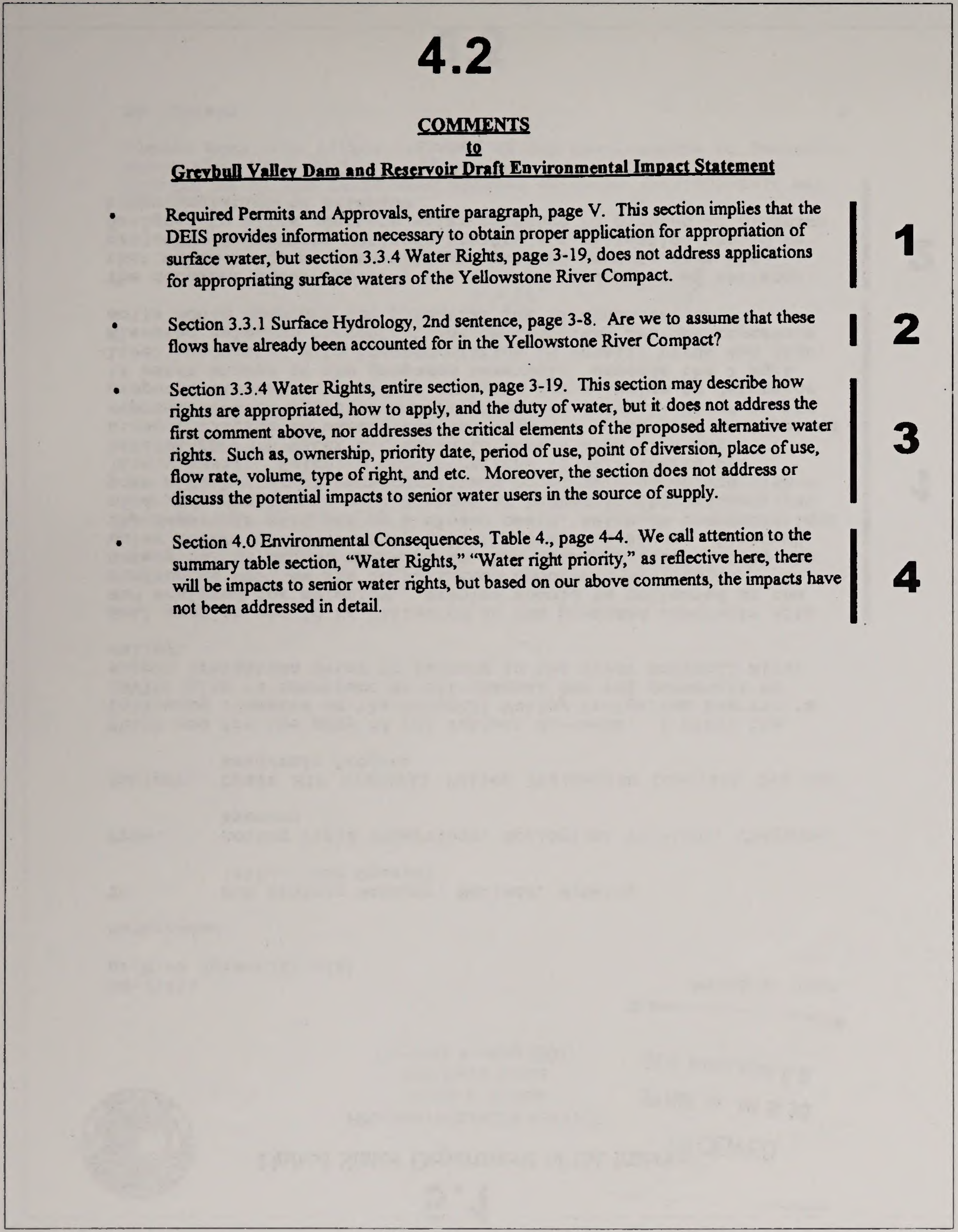
Questions may be directed to Rick Stefanic at (406)247-7911.

David W. Pennington

Attachment

Letter 4
USDI, Bureau of Indian Affairs - February 26, 1997

Thank you for your comments. Responses to your comments are on the following page.



4.2

COMMENTS
to
Greybull Valley Dam and Reservoir Draft Environmental Impact Statement

- Required Permits and Approvals, entire paragraph, page V. This section implies that the DEIS provides information necessary to obtain proper application for appropriation of surface water, but section 3.3.4 Water Rights, page 3-19, does not address applications for appropriating surface waters of the Yellowstone River Compact. **1**
- Section 3.3.1 Surface Hydrology, 2nd sentence, page 3-8. Are we to assume that these flows have already been accounted for in the Yellowstone River Compact? **2**
- Section 3.3.4 Water Rights, entire section, page 3-19. This section may describe how rights are appropriated, how to apply, and the duty of water, but it does not address the first comment above, nor addresses the critical elements of the proposed alternative water rights. Such as, ownership, priority date, period of use, point of diversion, place of use, flow rate, volume, type of right, and etc. Moreover, the section does not address or discuss the potential impacts to senior water users in the source of supply. **3**
- Section 4.0 Environmental Consequences, Table 4., page 4-4. We call attention to the summary table section, "Water Rights," "Water right priority," as reflective here, there will be impacts to senior water rights, but based on our above comments, the impacts have not been addressed in detail. **4**

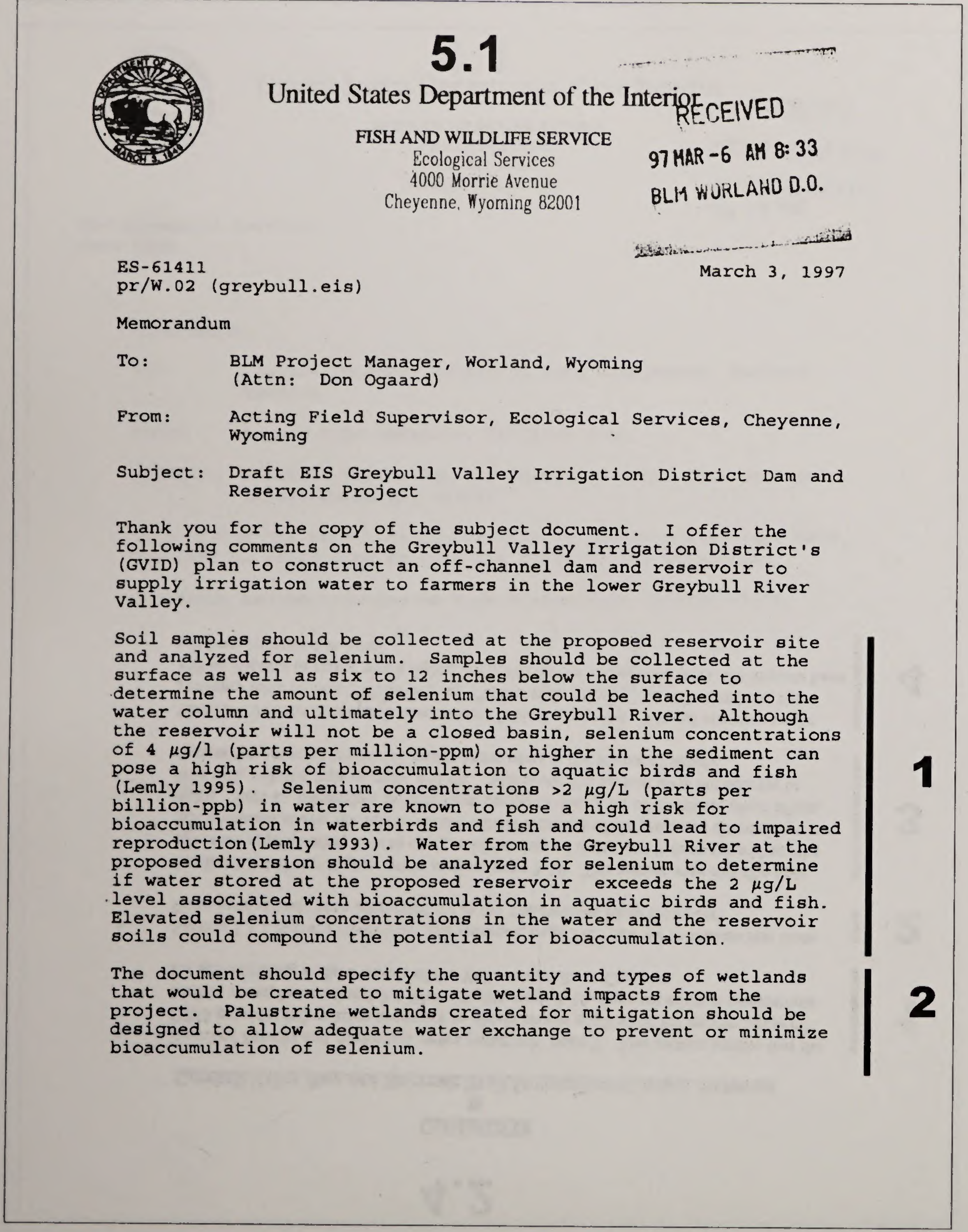
1. Appropriation of surface water in Wyoming under the Yellowstone Compact is accomplished by submittal of a water right application to the Wyoming State Engineer's Office. The review process of the State Engineer includes a review of the project with regard to Compact provisions and the application is rejected or modified if it would exceed Compact allocations.

2. Yes. All current water rights and authorized water uses on the Greybull River have permits issued by the State Engineer's Office and have been reviewed with regard to Compact allocations.

3. The proposed alternative would have a reservoir storage right with a current priority and, as such, would be junior in priority to all existing water rights on the Greybull River. The river will be regulated by the Wyoming Board of Control to ensure that the project does not negatively affect any existing water rights on the Greybull River as discussed in Section 4.3.4 on page 4-28.

   Senior water right holders on the Big Horn River are not likely impacted because the available data (WWDC and University of Wyoming 1990) indicate that approximately 1,600,000 acre-feet of water per year remains available to Wyoming water users in the Wind and Big Horn River basins under the Yellowstone River Compact and the project depletions would result in a very small reduction in the available water.

4. State law regarding water rights expressly provides for senior water rights. Impacts to senior water rights on the Greybull River would be generally positive as discussed in Section 4.3.4.



5.1

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
4000 Morrie Avenue
Cheyenne, Wyoming 82001

RECEIVED
97 MAR -6 AM 8:33
BLM WORLAND D.O.

ES-61411
pr/W.02 (greybull.eis)

March 3, 1997

Memorandum

To: BLM Project Manager, Worland, Wyoming
(Attn: Don Ogaard)

From: Acting Field Supervisor, Ecological Services, Cheyenne, Wyoming

Subject: Draft EIS Greybull Valley Irrigation District Dam and Reservoir Project

Thank you for the copy of the subject document. I offer the following comments on the Greybull Valley Irrigation District's (GVID) plan to construct an off-channel dam and reservoir to supply irrigation water to farmers in the lower Greybull River Valley.

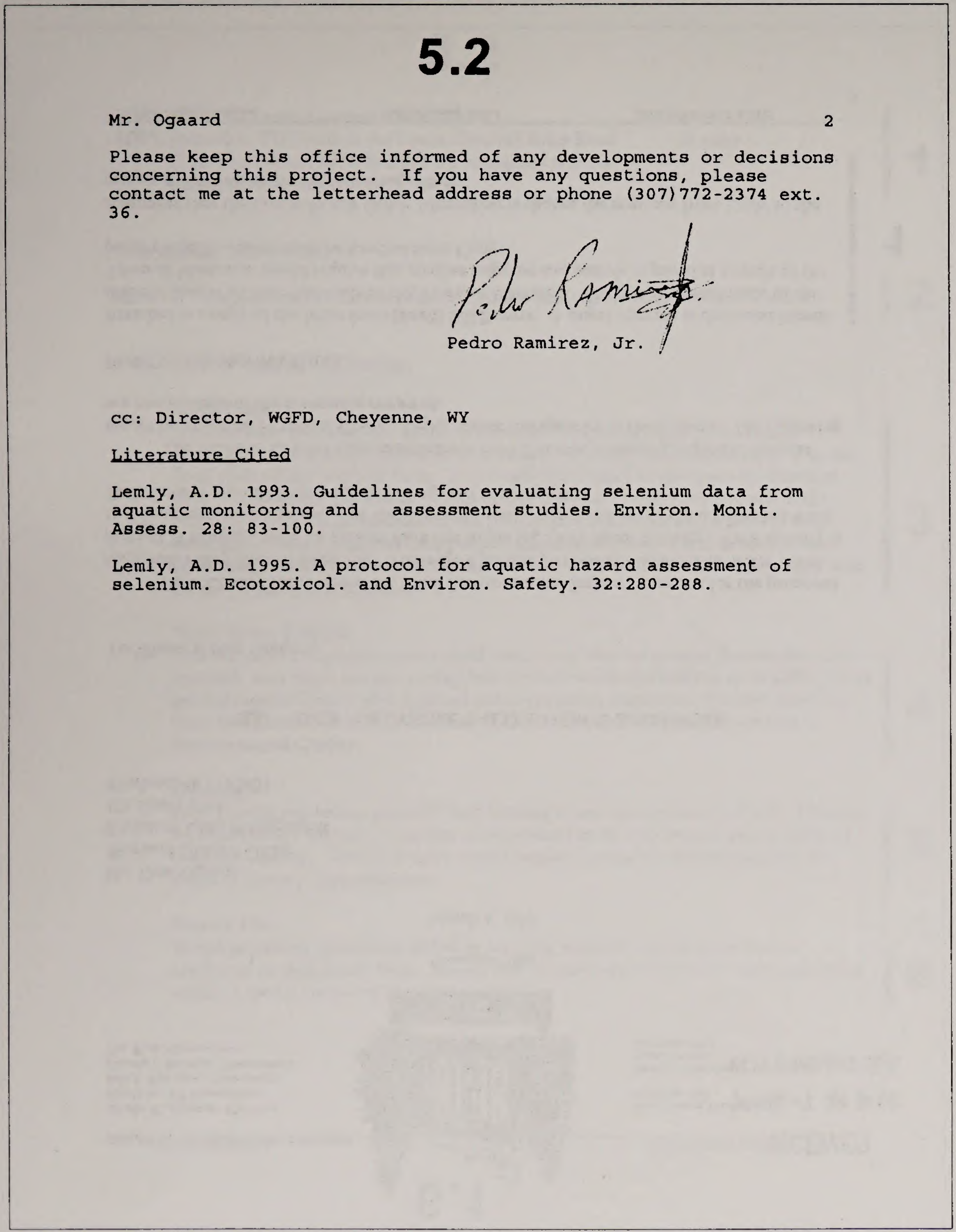
Soil samples should be collected at the proposed reservoir site and analyzed for selenium. Samples should be collected at the surface as well as six to 12 inches below the surface to determine the amount of selenium that could be leached into the water column and ultimately into the Greybull River. Although the reservoir will not be a closed basin, selenium concentrations of 4 µg/l (parts per million-ppm) or higher in the sediment can pose a high risk of bioaccumulation to aquatic birds and fish (Lemly 1995). Selenium concentrations >2 µg/L (parts per billion-ppb) in water are known to pose a high risk for bioaccumulation in waterbirds and fish and could lead to impaired reproduction (Lemly 1993). Water from the Greybull River at the proposed diversion should be analyzed for selenium to determine if water stored at the proposed reservoir exceeds the 2 µg/L level associated with bioaccumulation in aquatic birds and fish. Elevated selenium concentrations in the water and the reservoir soils could compound the potential for bioaccumulation. 1

The document should specify the quantity and types of wetlands that would be created to mitigate wetland impacts from the project. Palustrine wetlands created for mitigation should be designed to allow adequate water exchange to prevent or minimize bioaccumulation of selenium. 2

Letter 5
USDI, Fish and Wildlife Service - March 3, 1997

1. Three comments were received regarding potential selenium levels in the reservoir. Due to these concerns, sediment and water samples were collected from the Greybull River at the proposed diversion points for the two alternatives and from existing stock ponds located at the proposed reservoir sites and analyzed for dissolved and total selenium. A report of methods and results of the sampling are contained in Appendix F. Results of the selenium analysis were similar to existing water quality data for the Greybull River (Table 3.2, DEIS). No dissolved selenium was found in water samples collected; total selenium was detected in water samples from the ponds at the Blackstone Reservoir site (0.008 - 0.011 mg/L). No selenium was detected in the sediment from either reservoir site. Total selenium was found in the sediment in the Greybull River (0.142 - 0.210 mg/Kg).

Selenium accumulation has been found to be a problem in closed basins where evaporation can concentrate chemical constituents of runoff originating on selenium rich soils. One of the mitigation measures that has been proposed to alleviate this condition in areas where it is a problem is flushing of the basins with water containing lower selenium levels (Engberg and Cappellucci 1993). The operation of the proposed reservoir includes filling and emptying the reservoir on a nearly annual basis. Therefore, even if the Willwood Formation derived soils in the reservoir basin were to contain selenium in significant quantities, the operation of the reservoir would reduce the likelihood that concentrations in the reservoir water would become a problem.



5.2

Mr. Ogaard 2

Please keep this office informed of any developments or decisions concerning this project. If you have any questions, please contact me at the letterhead address or phone (307)772-2374 ext. 36.

Pedro Ramirez, Jr.

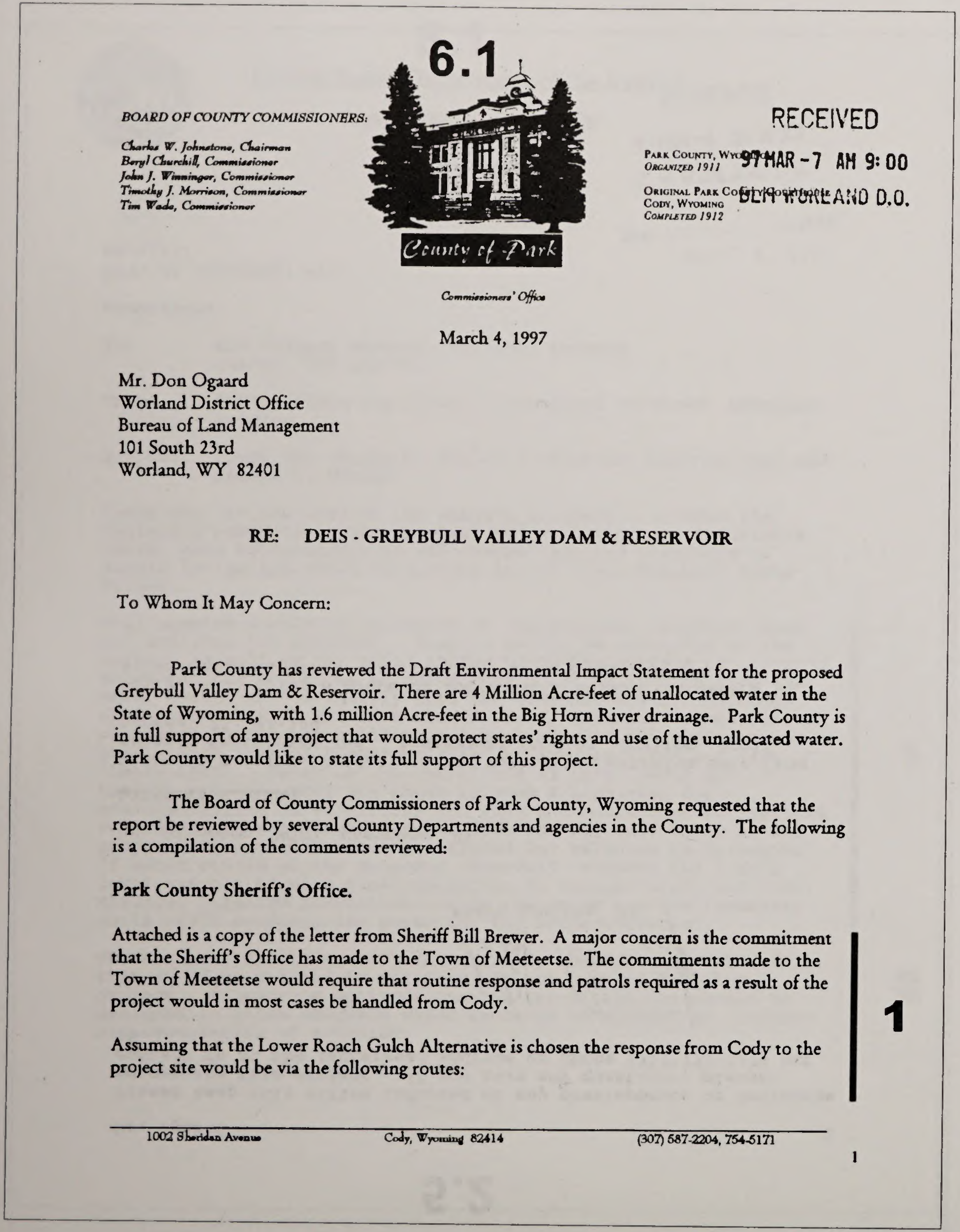
cc: Director, WGFD, Cheyenne, WY

Literature Cited

Lemly, A.D. 1993. Guidelines for evaluating selenium data from aquatic monitoring and assessment studies. Environ. Monit. Assess. 28: 83-100.

Lemly, A.D. 1995. A protocol for aquatic hazard assessment of selenium. Ecotoxicol. and Environ. Safety. 32:280-288.

2. The quantity and types of wetlands that will be created to mitigate wetland impacts and which will result from the project are discussed in Section 5.6.1 WETLANDS (page 5-3). Additionally, a wetland report was prepared detailing results of wetland delineations for the proposed project (WEST 1996c). Final wetland mitigation acres and sites will be determined in the 404 permit process. Wetlands created for mitigation will likely be along the Greybull River riparian corridor where adequate water exchange exists to minimize bioaccumulation of selenium.



6.1

BOARD OF COUNTY COMMISSIONERS:

Charles W. Johnstone, Chairman
Beryl Churchill, Commissioner
John J. Winninger, Commissioner
Timothy J. Morrison, Commissioner
Tim Wade, Commissioner

County of Park

Commissioners' Office

Park County, Wyo
Organized 1911

Original Park County Courthouse
Cody, Wyoming
Completed 1912

RECEIVED
97 MAR -7 AM 9:00
BLM WORLAND D.O.

March 4, 1997

Mr. Don Ogaard
Worland District Office
Bureau of Land Management
101 South 23rd
Worland, WY 82401

RE: DEIS - GREYBULL VALLEY DAM & RESERVOIR

To Whom It May Concern:

Park County has reviewed the Draft Environmental Impact Statement for the proposed Greybull Valley Dam & Reservoir. There are 4 Million Acre-feet of unallocated water in the State of Wyoming, with 1.6 million Acre-feet in the Big Horn River drainage. Park County is in full support of any project that would protect states' rights and use of the unallocated water. Park County would like to state its full support of this project.

The Board of County Commissioners of Park County, Wyoming requested that the report be reviewed by several County Departments and agencies in the County. The following is a compilation of the comments reviewed:

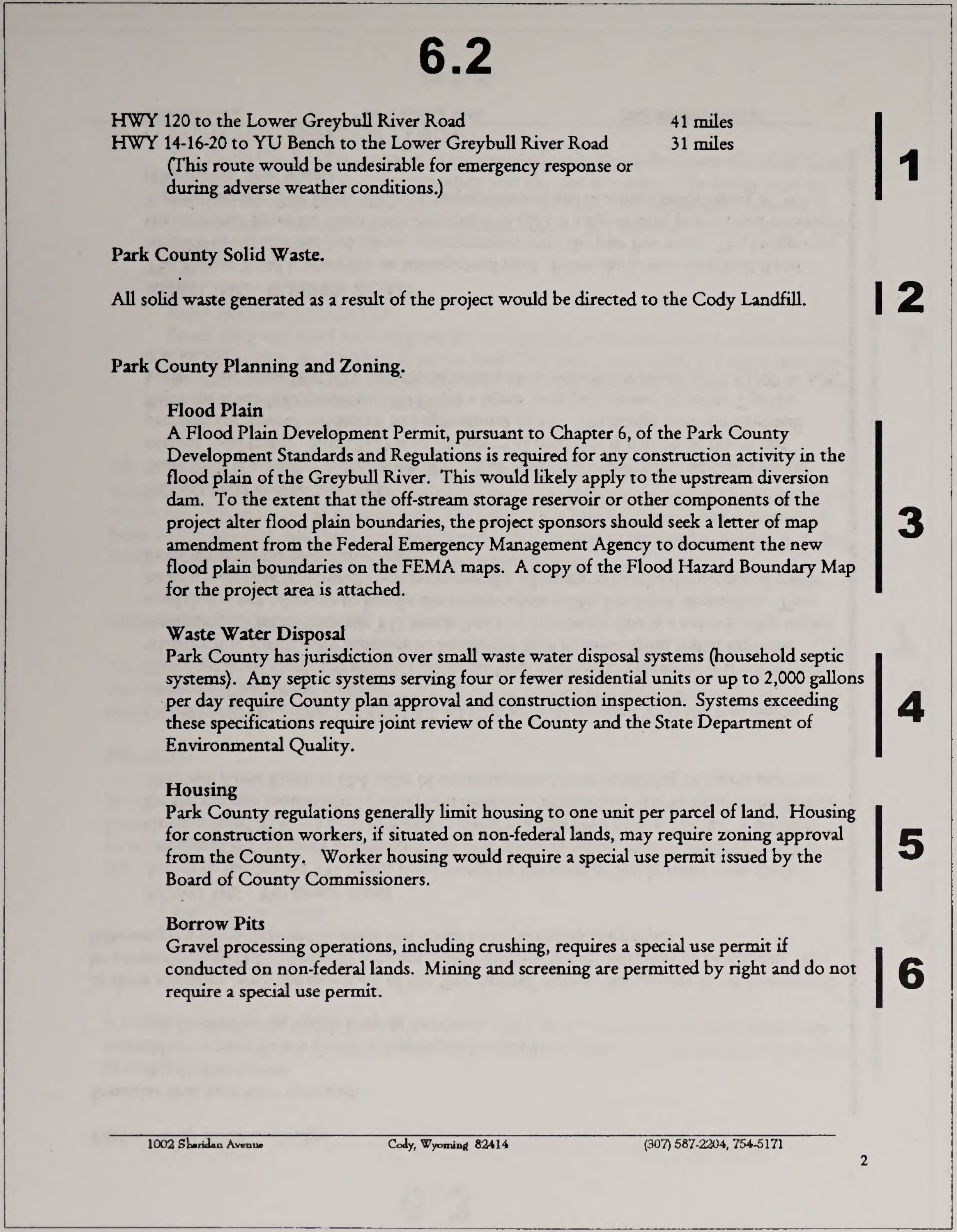
Park County Sheriff's Office.

Attached is a copy of the letter from Sheriff Bill Brewer. A major concern is the commitment that the Sheriff's Office has made to the Town of Meeteetse. The commitments made to the Town of Meeteetse would require that routine response and patrols required as a result of the project would in most cases be handled from Cody. **1**

Assuming that the Lower Roach Gulch Alternative is chosen the response from Cody to the project site would be via the following routes:

Letter 6
Park County Commissioners - March 4, 1997

1. Please see responses to comments of the attached letters from the Park County Sheriff's Office (pages 6.6 - 6.8 below).



6.2

HWY 120 to the Lower Greybull River Road 41 miles
HWY 14-16-20 to YU Bench to the Lower Greybull River Road 31 miles
(This route would be undesirable for emergency response or during adverse weather conditions.) 1

Park County Solid Waste.

All solid waste generated as a result of the project would be directed to the Cody Landfill. 2

Park County Planning and Zoning.

Flood Plain
A Flood Plain Development Permit, pursuant to Chapter 6, of the Park County Development Standards and Regulations is required for any construction activity in the flood plain of the Greybull River. This would likely apply to the upstream diversion dam. To the extent that the off-stream storage reservoir or other components of the project alter flood plain boundaries, the project sponsors should seek a letter of map amendment from the Federal Emergency Management Agency to document the new flood plain boundaries on the FEMA maps. A copy of the Flood Hazard Boundary Map for the project area is attached. 3

Waste Water Disposal
Park County has jurisdiction over small waste water disposal systems (household septic systems). Any septic systems serving four or fewer residential units or up to 2,000 gallons per day require County plan approval and construction inspection. Systems exceeding these specifications require joint review of the County and the State Department of Environmental Quality. 4

Housing
Park County regulations generally limit housing to one unit per parcel of land. Housing for construction workers, if situated on non-federal lands, may require zoning approval from the County. Worker housing would require a special use permit issued by the Board of County Commissioners. 5

Borrow Pits
Gravel processing operations, including crushing, requires a special use permit if conducted on non-federal lands. Mining and screening are permitted by right and do not require a special use permit. 6

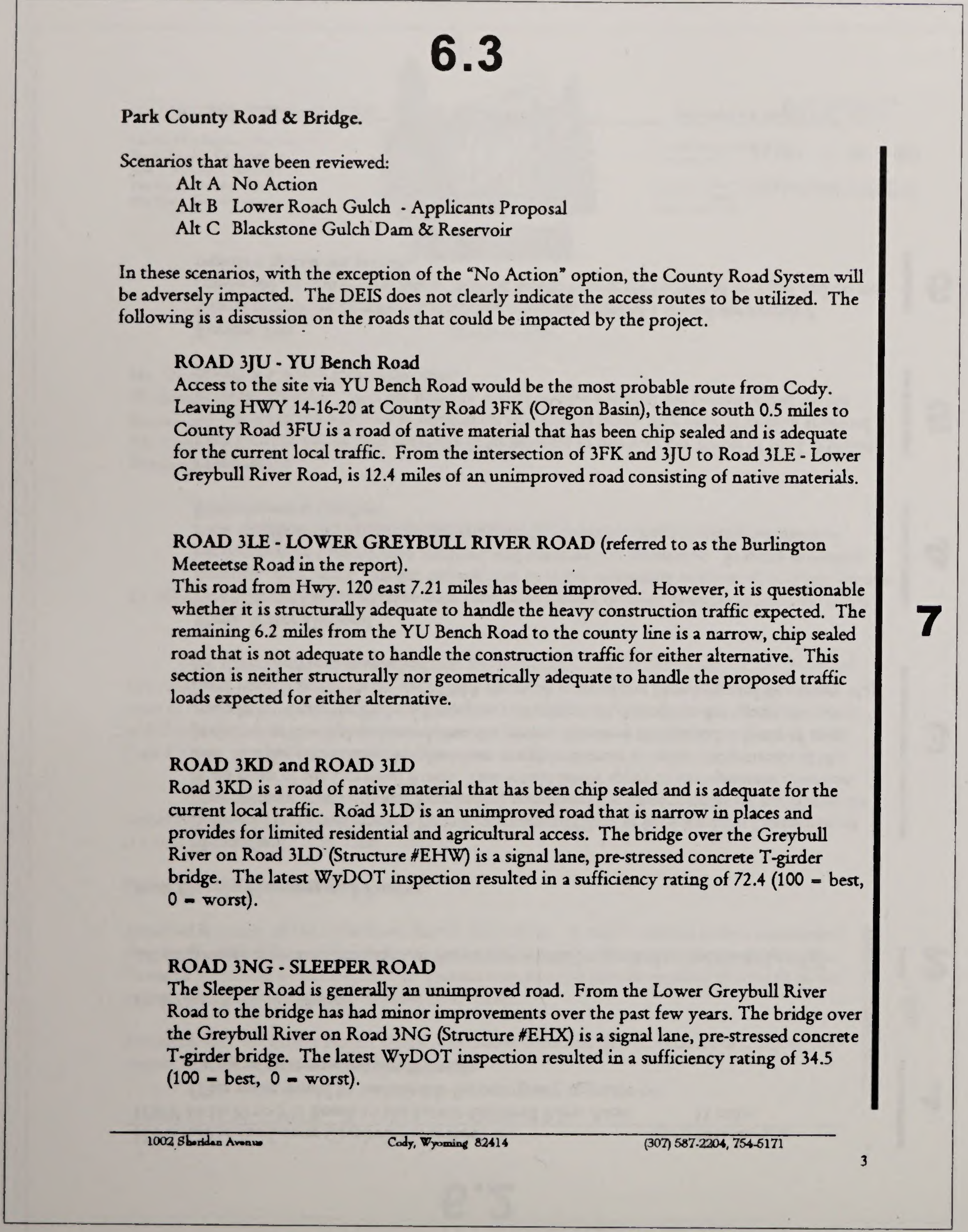
2. Sections 3.8.4.5 and 4.8.4.5 Solid Waste Disposal have been added (see CHAPTER 2.0 ADDITIONS AND ERRATA). Solid waste from the project will be disposed of in the Cody landfill. Hazardous waste will be taken to the Worland landfill.

3. A flood plain development permit has been added to the list of required permits. The proponent will maintain compliance with the FEMA map requirement.

4. It is not anticipated that a waste water disposal system will be needed or installed for the project. However, if one is needed the appropriate permits will be obtained from the county and/or State Department of Environmental Quality by the proponent. The impact assessment presented in this EIS assumes all waste water will be disposed of in an approved facility.

5. It is preferable to utilize existing housing for the construction work force. It is assumed that no new housing will be built for temporarily relocating workers during construction of the reservoir. However, if additional housing is required, the proponent will be required to comply with county zoning regulations and permitting requirements of the Board of County Commissioners

6. The anticipated sources of borrow material for construction of the reservoir is public land (BLM). However, if non-federal land were needed the proponent would acquire the necessary permits.



6.3

Park County Road & Bridge.

Scenarios that have been reviewed:

Alt A No Action
Alt B Lower Roach Gulch - Applicants Proposal
Alt C Blackstone Gulch Dam & Reservoir

In these scenarios, with the exception of the "No Action" option, the County Road System will be adversely impacted. The DEIS does not clearly indicate the access routes to be utilized. The following is a discussion on the roads that could be impacted by the project.

ROAD 3JU - YU Bench Road
Access to the site via YU Bench Road would be the most probable route from Cody. Leaving HWY 14-16-20 at County Road 3FK (Oregon Basin), thence south 0.5 miles to County Road 3FU is a road of native material that has been chip sealed and is adequate for the current local traffic. From the intersection of 3FK and 3JU to Road 3LE - Lower Greybull River Road, is 12.4 miles of an unimproved road consisting of native materials.

ROAD 3LE - LOWER GREYBULL RIVER ROAD (referred to as the Burlington Meeteetse Road in the report).
This road from Hwy. 120 east 7.21 miles has been improved. However, it is questionable whether it is structurally adequate to handle the heavy construction traffic expected. The remaining 6.2 miles from the YU Bench Road to the county line is a narrow, chip sealed road that is not adequate to handle the construction traffic for either alternative. This section is neither structurally nor geometrically adequate to handle the proposed traffic loads expected for either alternative.

ROAD 3KD and ROAD 3LD
Road 3KD is a road of native material that has been chip sealed and is adequate for the current local traffic. Road 3LD is an unimproved road that is narrow in places and provides for limited residential and agricultural access. The bridge over the Greybull River on Road 3LD (Structure #EHW) is a signal lane, pre-stressed concrete T-girder bridge. The latest WyDOT inspection resulted in a sufficiency rating of 72.4 (100 = best, 0 = worst).

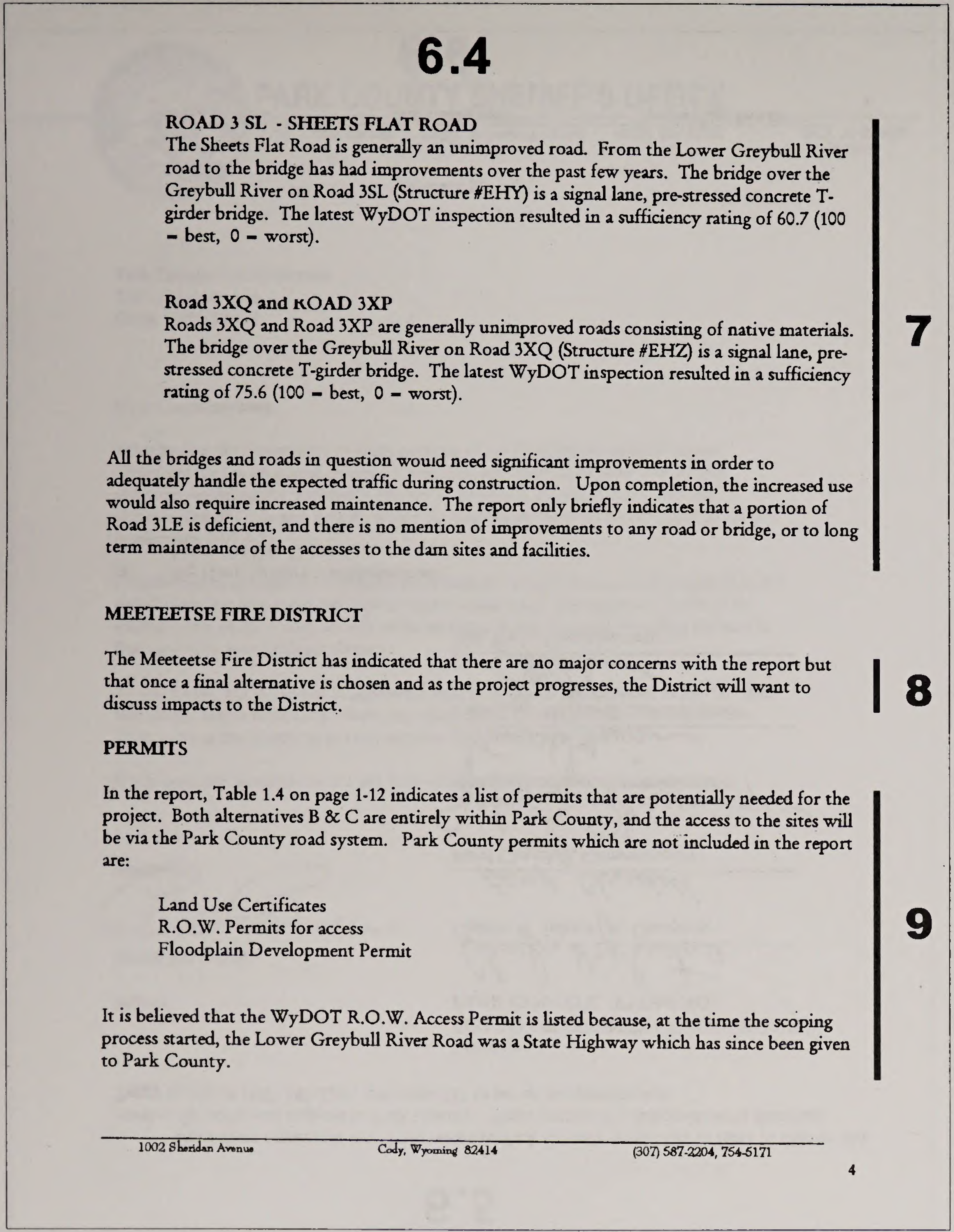
ROAD 3NG - SLEEPER ROAD
The Sleeper Road is generally an unimproved road. From the Lower Greybull River Road to the bridge has had minor improvements over the past few years. The bridge over the Greybull River on Road 3NG (Structure #EHX) is a signal lane, pre-stressed concrete T-girder bridge. The latest WyDOT inspection resulted in a sufficiency rating of 34.5 (100 = best, 0 = worst).

7

1002 Sheridan Avenue   Cody, Wyoming 82414   (307) 587-2204, 754-5171

3

7. The decision about access routes to the project will be made between the county and GVID based on the selected alternative. The routes and provisions for mitigating potential impacts will be agreed upon during the time county permits are acquired. Descriptions of potential access routes to the two reservoir alternatives sites has been added to the DEIS (see Chapter 2.0 ADDITIONS AND ERRATA)



6.4

ROAD 3 SL - SHEETS FLAT ROAD
The Sheets Flat Road is generally an unimproved road. From the Lower Greybull River road to the bridge has had improvements over the past few years. The bridge over the Greybull River on Road 3SL (Structure #EHY) is a signal lane, pre-stressed concrete T-girder bridge. The latest WyDOT inspection resulted in a sufficiency rating of 60.7 (100 – best, 0 – worst).

Road 3XQ and ROAD 3XP
Roads 3XQ and Road 3XP are generally unimproved roads consisting of native materials. The bridge over the Greybull River on Road 3XQ (Structure #EHZ) is a signal lane, pre-stressed concrete T-girder bridge. The latest WyDOT inspection resulted in a sufficiency rating of 75.6 (100 – best, 0 – worst).

All the bridges and roads in question would need significant improvements in order to adequately handle the expected traffic during construction. Upon completion, the increased use would also require increased maintenance. The report only briefly indicates that a portion of Road 3LE is deficient, and there is no mention of improvements to any road or bridge, or to long term maintenance of the accesses to the dam sites and facilities. **7**

MEETEETSE FIRE DISTRICT

The Meeteetse Fire District has indicated that there are no major concerns with the report but that once a final alternative is chosen and as the project progresses, the District will want to discuss impacts to the District. **8**

PERMITS

In the report, Table 1.4 on page 1-12 indicates a list of permits that are potentially needed for the project. Both alternatives B & C are entirely within Park County, and the access to the sites will be via the Park County road system. Park County permits which are not included in the report are:

Land Use Certificates
R.O.W. Permits for access
Floodplain Development Permit

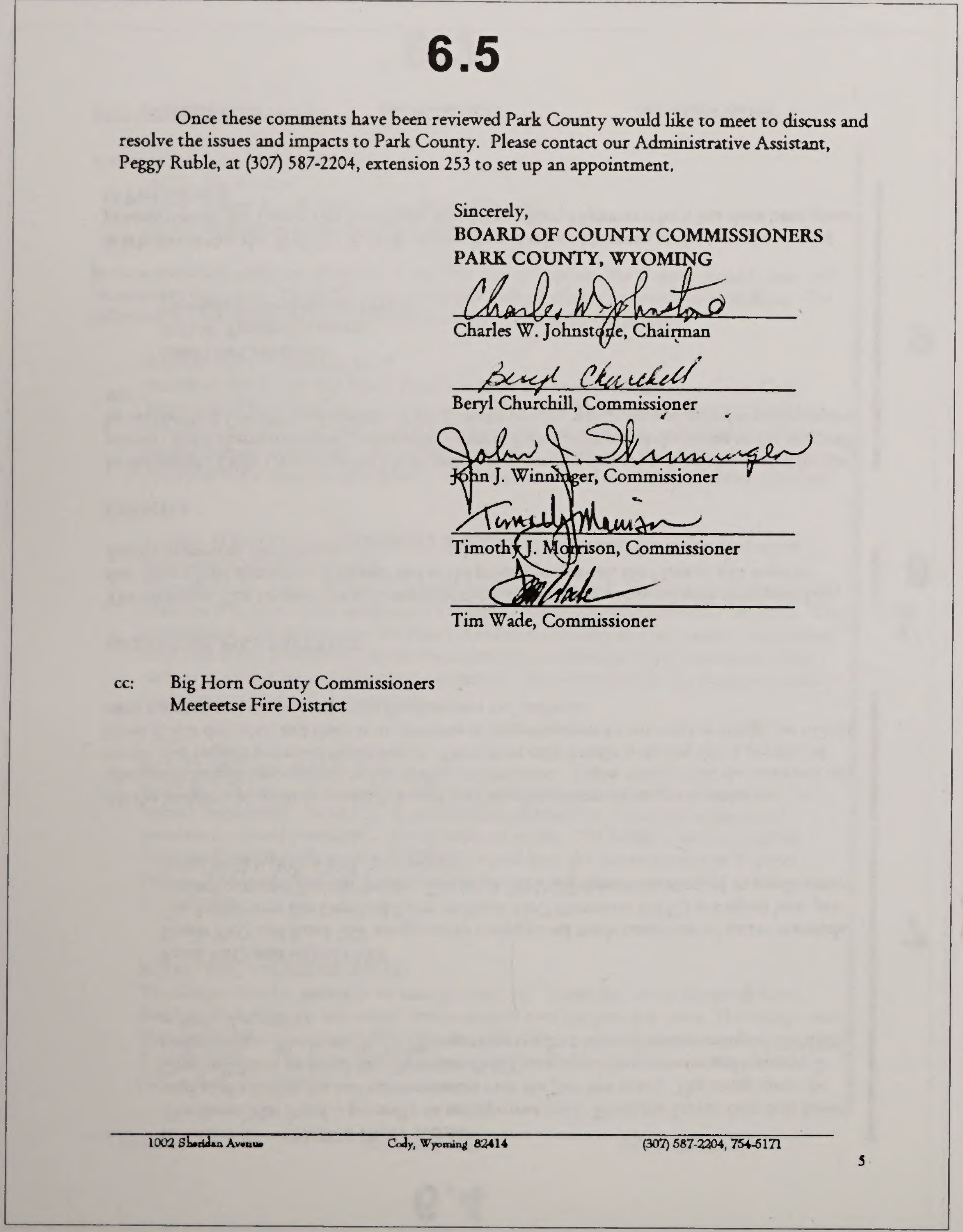
It is believed that the WyDOT R.O.W. Access Permit is listed because, at the time the scoping process started, the Lower Greybull River Road was a State Highway which has since been given to Park County. **9**

1002 Sheridan Avenue Cody, Wyoming 82414 (307) 587-2204, 754-5171

4

8. The BLM and the Corps are cognizant of fire risks. The GVID will coordinate with the local fire district and the POD required by the BLM will identify a contingency plan for fires.

9. The list of required permits has been updated to reflect the needed permits.



6.5

Once these comments have been reviewed Park County would like to meet to discuss and resolve the issues and impacts to Park County. Please contact our Administrative Assistant, Peggy Ruble, at (307) 587-2204, extension 253 to set up an appointment.

Sincerely,
BOARD OF COUNTY COMMISSIONERS
PARK COUNTY, WYOMING

Charles W. Johnstone
Charles W. Johnstone, Chairman

Beryl Churchill
Beryl Churchill, Commissioner

John J. Winninger
John J. Winninger, Commissioner

Timothy J. Morrison
Timothy J. Morrison, Commissioner

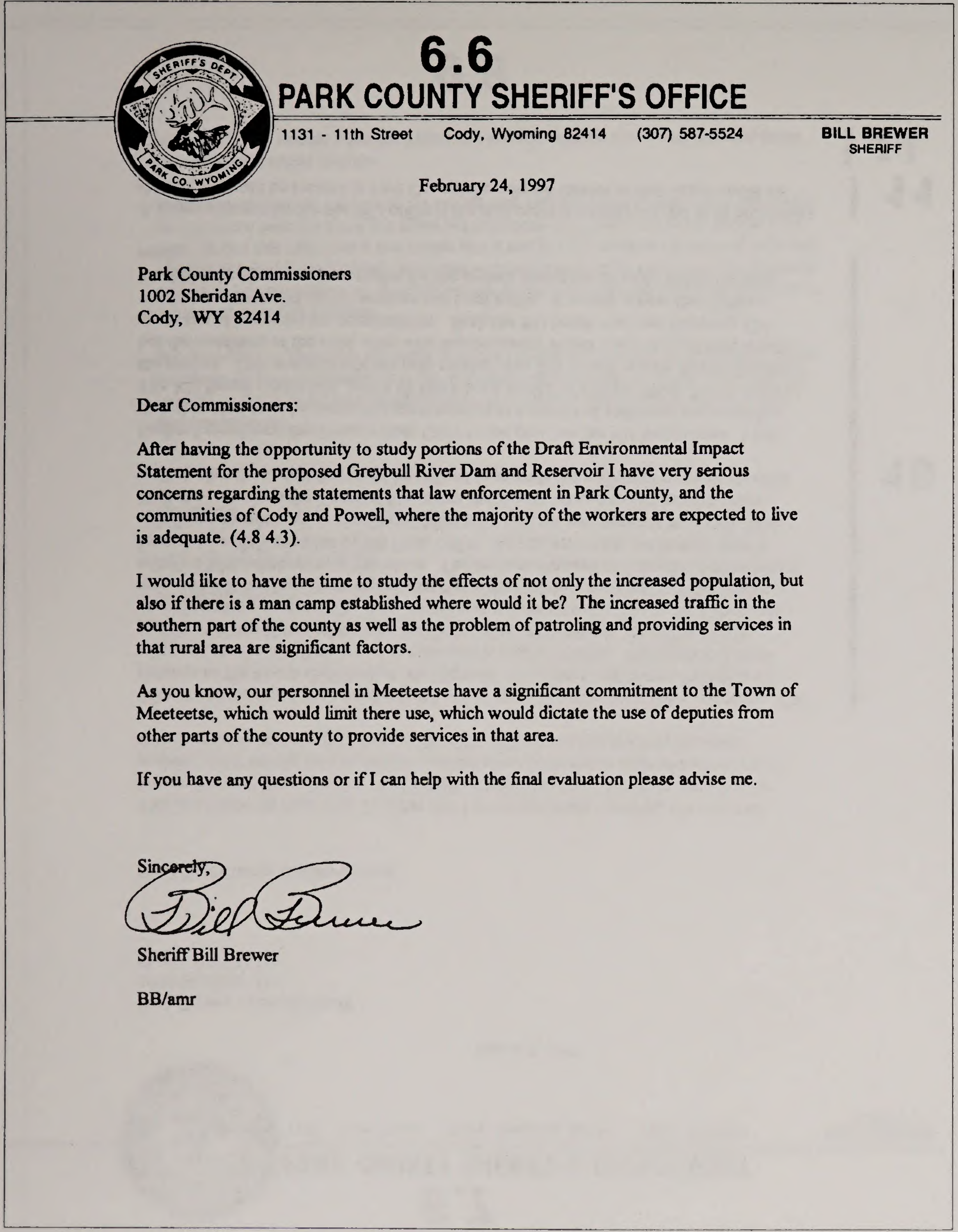
Tim Wade, Commissioner

cc: Big Horn County Commissioners
Meeteetse Fire District

1002 Sheridan Avenue Cody, Wyoming 82414 (307) 587-2204, 754-5171

5

Attached letter from Park County Sheriff's Office - February 24, 1997



6.6

PARK COUNTY SHERIFF'S OFFICE
1131 - 11th Street Cody, Wyoming 82414 (307) 587-5524
BILL BREWER
SHERIFF

February 24, 1997

Park County Commissioners
1002 Sheridan Ave.
Cody, WY 82414

Dear Commissioners:

After having the opportunity to study portions of the Draft Environmental Impact Statement for the proposed Greybull River Dam and Reservoir I have very serious concerns regarding the statements that law enforcement in Park County, and the communities of Cody and Powell, where the majority of the workers are expected to live is adequate. (4.8 4.3).

I would like to have the time to study the effects of not only the increased population, but also if there is a man camp established where would it be? The increased traffic in the southern part of the county as well as the problem of patroling and providing services in that rural area are significant factors.

As you know, our personnel in Meeteetse have a significant commitment to the Town of Meeteetse, which would limit there use, which would dictate the use of deputies from other parts of the county to provide services in that area.

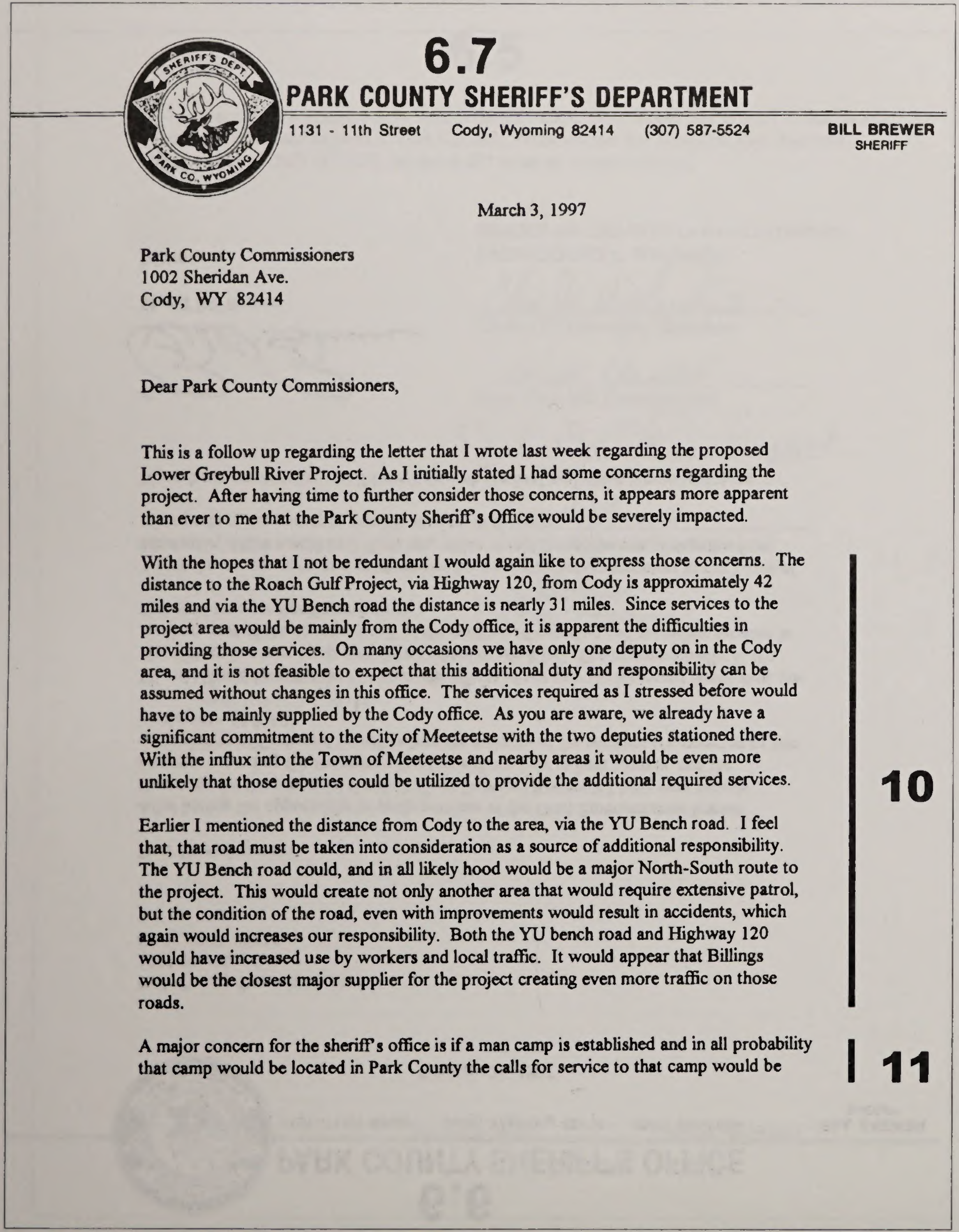
If you have any questions or if I can help with the final evaluation please advise me.

Sincerely,

Bill Brewer

Sheriff Bill Brewer

BB/amr



6.7

PARK COUNTY SHERIFF'S DEPARTMENT

1131 - 11th Street Cody, Wyoming 82414 (307) 587-5524

BILL BREWER
SHERIFF

March 3, 1997

Park County Commissioners
1002 Sheridan Ave.
Cody, WY 82414

Dear Park County Commissioners,

This is a follow up regarding the letter that I wrote last week regarding the proposed Lower Greybull River Project. As I initially stated I had some concerns regarding the project. After having time to further consider those concerns, it appears more apparent than ever to me that the Park County Sheriff's Office would be severely impacted.

With the hopes that I not be redundant I would again like to express those concerns. The distance to the Roach Gulf Project, via Highway 120, from Cody is approximately 42 miles and via the YU Bench road the distance is nearly 31 miles. Since services to the project area would be mainly from the Cody office, it is apparent the difficulties in providing those services. On many occasions we have only one deputy on in the Cody area, and it is not feasible to expect that this additional duty and responsibility can be assumed without changes in this office. The services required as I stressed before would have to be mainly supplied by the Cody office. As you are aware, we already have a significant commitment to the City of Meeteetse with the two deputies stationed there. With the influx into the Town of Meeteetse and nearby areas it would be even more unlikely that those deputies could be utilized to provide the additional required services. **10**

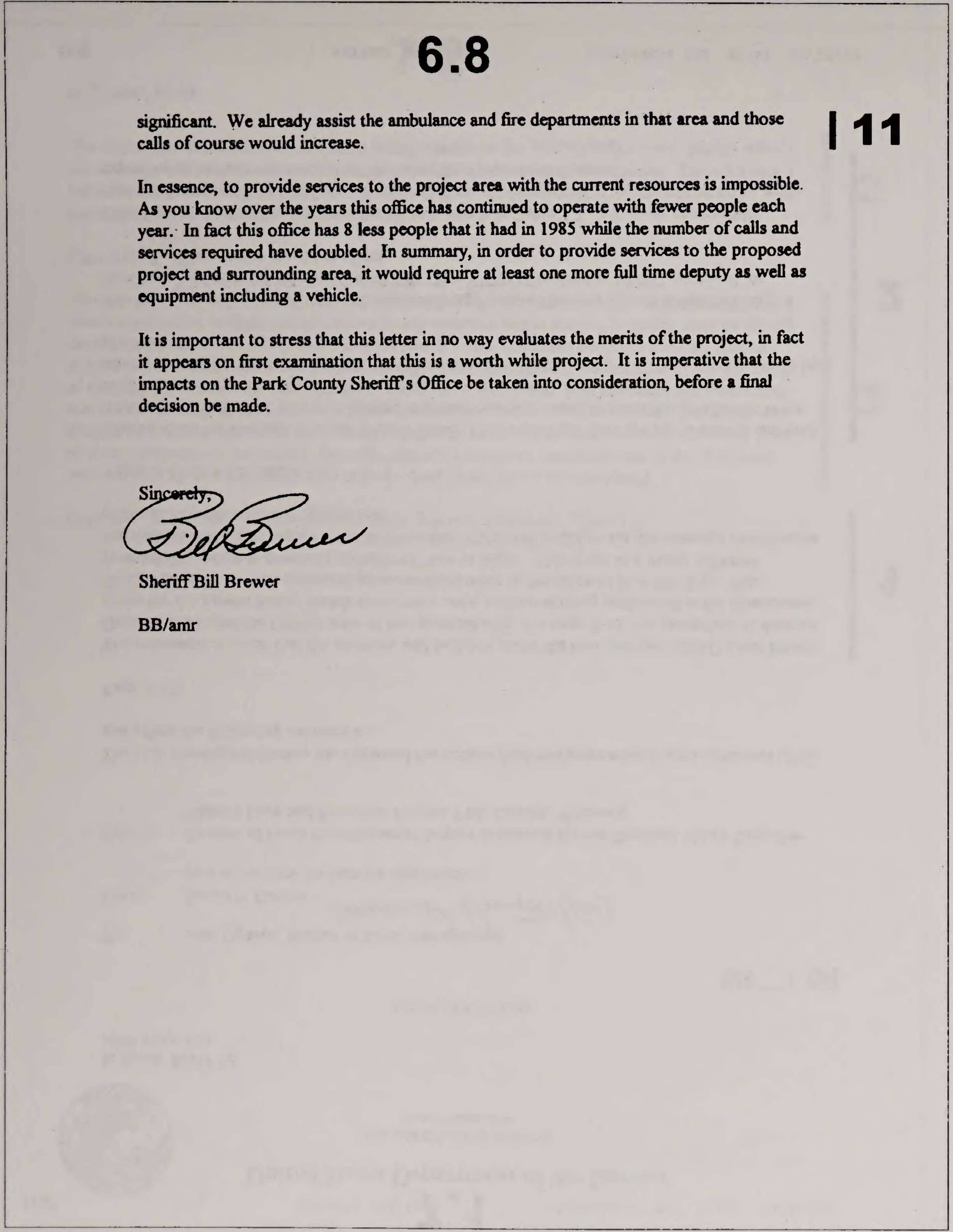
Earlier I mentioned the distance from Cody to the area, via the YU Bench road. I feel that, that road must be taken into consideration as a source of additional responsibility. The YU Bench road could, and in all likely hood would be a major North-South route to the project. This would create not only another area that would require extensive patrol, but the condition of the road, even with improvements would result in accidents, which again would increases our responsibility. Both the YU bench road and Highway 120 would have increased use by workers and local traffic. It would appear that Billings would be the closest major supplier for the project creating even more traffic on those roads.

A major concern for the sheriff's office is if a man camp is established and in all probability that camp would be located in Park County the calls for service to that camp would be **11**

Attached letter from Park County Sheriff's Office - March 3, 1997

10. If the Park County Sheriff's Department is inadequately staffed to handle increased law enforcement demands, then an additional deputy may be required during project construction. If funding for an additional deputy is not forthcoming from county resources, some mitigation may be necessary. This mitigation could take the form of additional security personnel hired by the contractor or subsidy to the Sheriff's Department to hire additional personnel. Many potential law enforcement problems can be avoided if GVID makes employment on the project contingent upon strict adherence to laws, regulations, and local ordinances. The POD and bid specifications provided by GVID to the contractor should stress adherence to these laws and regulations.

11. The BLM and Corps recognize the potential impacts of a man camp on law enforcement as well as the environment. For the purpose of evaluating impacts of the project on Park and Big Horn counties we assumed that GVID and the contractor would provide housing from the existing rental, motel, mobile home, and campground units. However, the final arrangements for housing will be unknown until the POD and final design for the dam is completed. If GVID determines a worker camp is required to house construction workers, additional impact assessment and mitigation measures may be required of GVID.



6.8

significant. We already assist the ambulance and fire departments in that area and those calls of course would increase. **| 11**

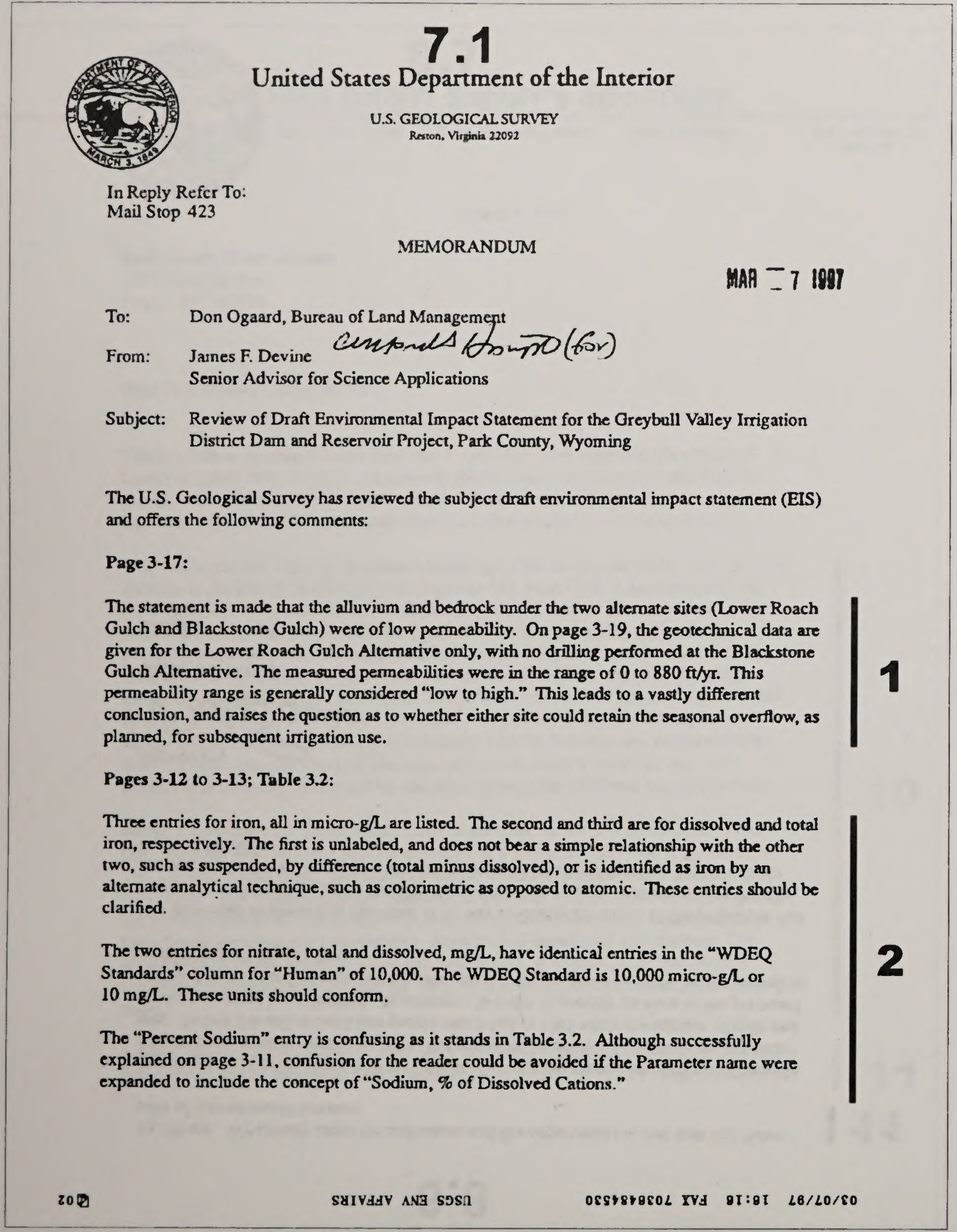
In essence, to provide services to the project area with the current resources is impossible. As you know over the years this office has continued to operate with fewer people each year. In fact this office has 8 less people that it had in 1985 while the number of calls and services required have doubled. In summary, in order to provide services to the proposed project and surrounding area, it would require at least one more full time deputy as well as equipment including a vehicle.

It is important to stress that this letter in no way evaluates the merits of the project, in fact it appears on first examination that this is a worth while project. It is imperative that the impacts on the Park County Sheriff's Office be taken into consideration, before a final decision be made.

Sincerely,

Sheriff Bill Brewer

BB/amr



7.1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Reston, Virginia 22092

In Reply Refer To:
Mail Stop 423

MEMORANDUM

MAR 7 1997

To: Don Ogaard, Bureau of Land Management

From: James F. Devine (for)
Senior Advisor for Science Applications

Subject: Review of Draft Environmental Impact Statement for the Greybull Valley Irrigation District Dam and Reservoir Project, Park County, Wyoming

The U.S. Geological Survey has reviewed the subject draft environmental impact statement (EIS) and offers the following comments:

Page 3-17:

The statement is made that the alluvium and bedrock under the two alternate sites (Lower Roach Gulch and Blackstone Gulch) were of low permeability. On page 3-19, the geotechnical data are given for the Lower Roach Gulch Alternative only, with no drilling performed at the Blackstone Gulch Alternative. The measured permeabilities were in the range of 0 to 880 ft/yr. This permeability range is generally considered "low to high." This leads to a vastly different conclusion, and raises the question as to whether either site could retain the seasonal overflow, as planned, for subsequent irrigation use. **1**

Pages 3-12 to 3-13; Table 3.2:

Three entries for iron, all in micro-g/L are listed. The second and third are for dissolved and total iron, respectively. The first is unlabeled, and does not bear a simple relationship with the other two, such as suspended, by difference (total minus dissolved), or is identified as iron by an alternate analytical technique, such as colorimetric as opposed to atomic. These entries should be clarified. **2**

The two entries for nitrate, total and dissolved, mg/L, have identical entries in the "WDEQ Standards" column for "Human" of 10,000. The WDEQ Standard is 10,000 micro-g/L or 10 mg/L. These units should conform.

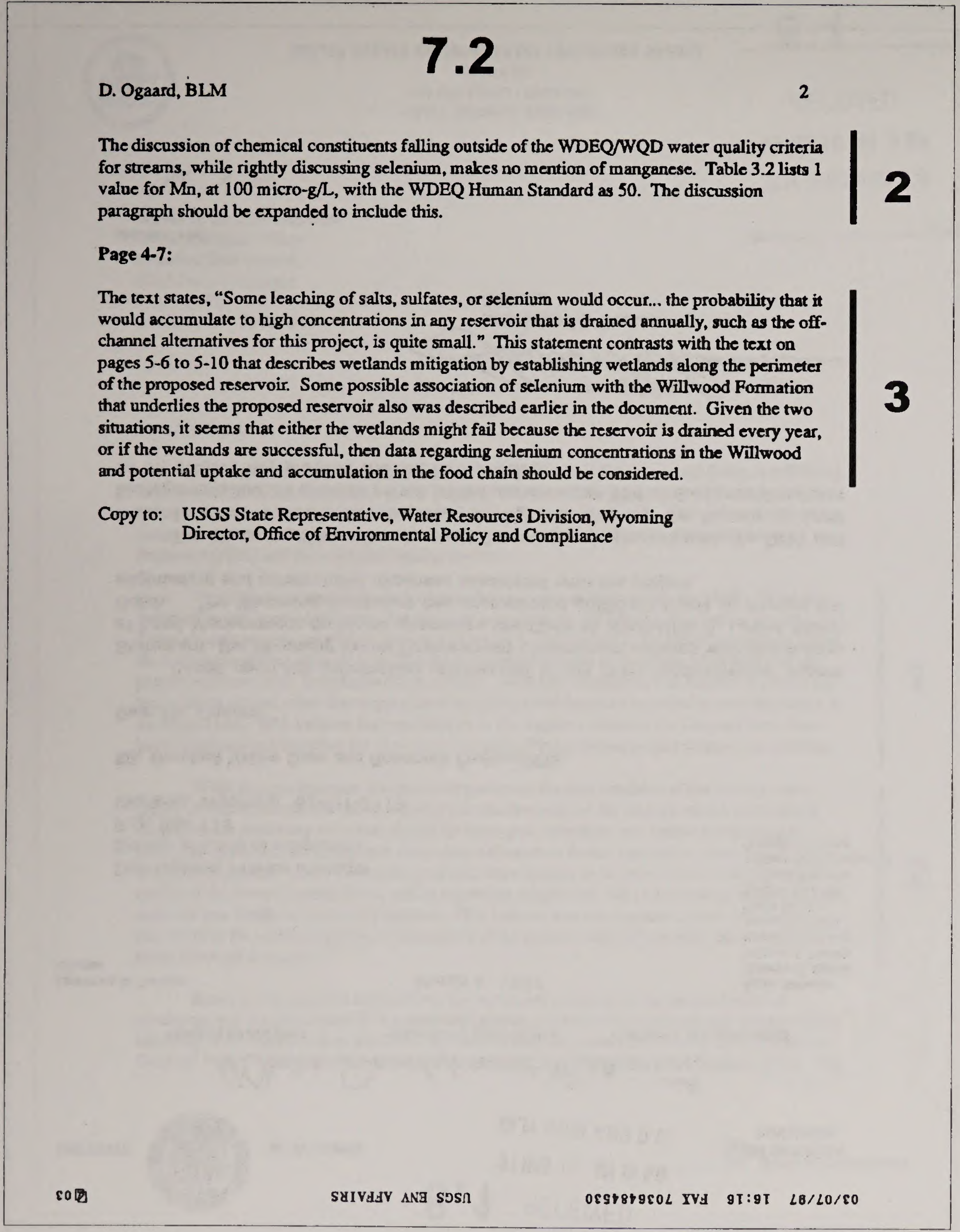
The "Percent Sodium" entry is confusing as it stands in Table 3.2. Although successfully explained on page 3-11, confusion for the reader could be avoided if the Parameter name were expanded to include the concept of "Sodium, % of Dissolved Cations."

03/07/97 18:16 FAX 7038484530 USGS ENV AFFAIRS 002

Letter 13
USDI, U.S. Geological Survey - March 7, 1997

1. While geotechnical data for the Blackstone Gulch Alternative are not available, it is assumed the data for the Lower Roach Gulch Alternative are representative of both alternatives because of proximity and the similar geology of the two sites. Measured permeabilities in the bedrock were zero (0) in most intervals except in fracture areas along the shear zones where the permeability was higher (GEI 1994a). Alluvial permeabilities were also greater than zero. As a result of this investigation, the dam will be designed with a cutoff trench extending through the alluvium and into the shear zone with a grout curtain beneath the cutoff trench. Incorporation of these features should prevent seepage along the zones of higher permeability.

2. Entries in Table 3.2 and appropriate discussions have been corrected and/or added (see CHAPTER 2.0 ADDITIONS AND ERRATA).



7.2

D. Ogaard, BLM 2

The discussion of chemical constituents falling outside of the WDEQ/WQD water quality criteria for streams, while rightly discussing selenium, makes no mention of manganese. Table 3.2 lists 1 value for Mn, at 100 micro-g/L, with the WDEQ Human Standard as 50. The discussion paragraph should be expanded to include this. **2**

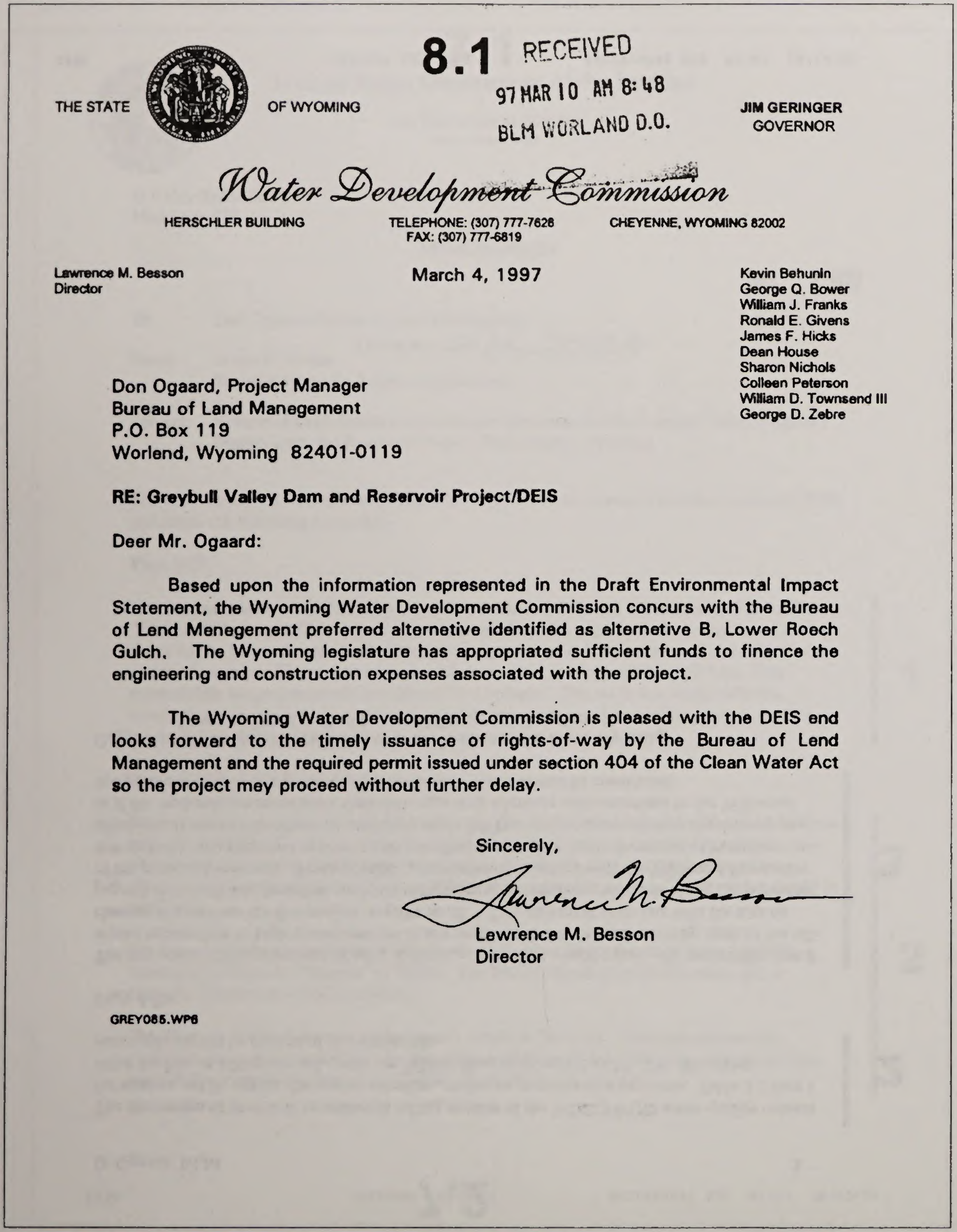
Page 4-7:

The text states, "Some leaching of salts, sulfates, or selenium would occur... the probability that it would accumulate to high concentrations in any reservoir that is drained annually, such as the off-channel alternatives for this project, is quite small." This statement contrasts with the text on pages 5-6 to 5-10 that describes wetlands mitigation by establishing wetlands along the perimeter of the proposed reservoir. Some possible association of selenium with the Willwood Formation that underlies the proposed reservoir also was described earlier in the document. Given the two situations, it seems that either the wetlands might fail because the reservoir is drained every year, or if the wetlands are successful, then data regarding selenium concentrations in the Willwood and potential uptake and accumulation in the food chain should be considered. **3**

Copy to: USGS State Representative, Water Resources Division, Wyoming
Director, Office of Environmental Policy and Compliance

03/07/97 16:16 FAX 7036484530 USGS ENV AFFAIRS 003

3. For a more detailed discussion of selenium please refer to response to letter 5 and Appendix F. Cretaceous shales are the primary source of selenium elsewhere in Wyoming (Engberg and Cappellucci 1993). The only formation in the area with potential as a significant source of selenium is the Fort Union Formation which underlies the Willwood formation by 2000 - 2500 feet at the proposed reservoir locations (Robinove and Langford 1963). The presence of selenium in the Fort Union Formation is variable depending on the prevalence of shale. Ground water is the most likely avenue for selenium to migrate from the Fort Union to the reservoir. The potential for ground water interchange with water in either alternative is very low. The permeability of the Willwood approached zero (0) in investigations conducted within the Lower Roach Gulch area, except in the few instances where fractures occur.



THE STATE OF WYOMING

JIM GERINGER
GOVERNOR

Water Development Commission

HERSCHLER BUILDING
TELEPHONE: (307) 777-7626
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CHEYENNE, WYOMING 82002

Lawrence M. Besson
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BLM WORLAND D.O.

March 4, 1997

Don Ogaard, Project Manager
Bureau of Land Management
P.O. Box 119
Worlend, Wyoming 82401-0119

RE: Greybull Valley Dam and Reservoir Project/DEIS

Deer Mr. Ogaard:

Based upon the information represented in the Draft Environmental Impact Stetement, the Wyoming Water Development Commission concurs with the Bureau of Lend Menegement preferred alternetive identified as elternetive B, Lower Roech Gulch. The Wyoming legislature has appropriated sufficient funds to finence the engineering and construction expenses associated with the project.

The Wyoming Water Development Commission is pleased with the DEIS end looks forwerd to the timely issuance of rights-of-way by the Bureau of Lend Management and the required permit issued under section 404 of the Clean Water Act so the project mey proceed without further delay.

Sincerely,

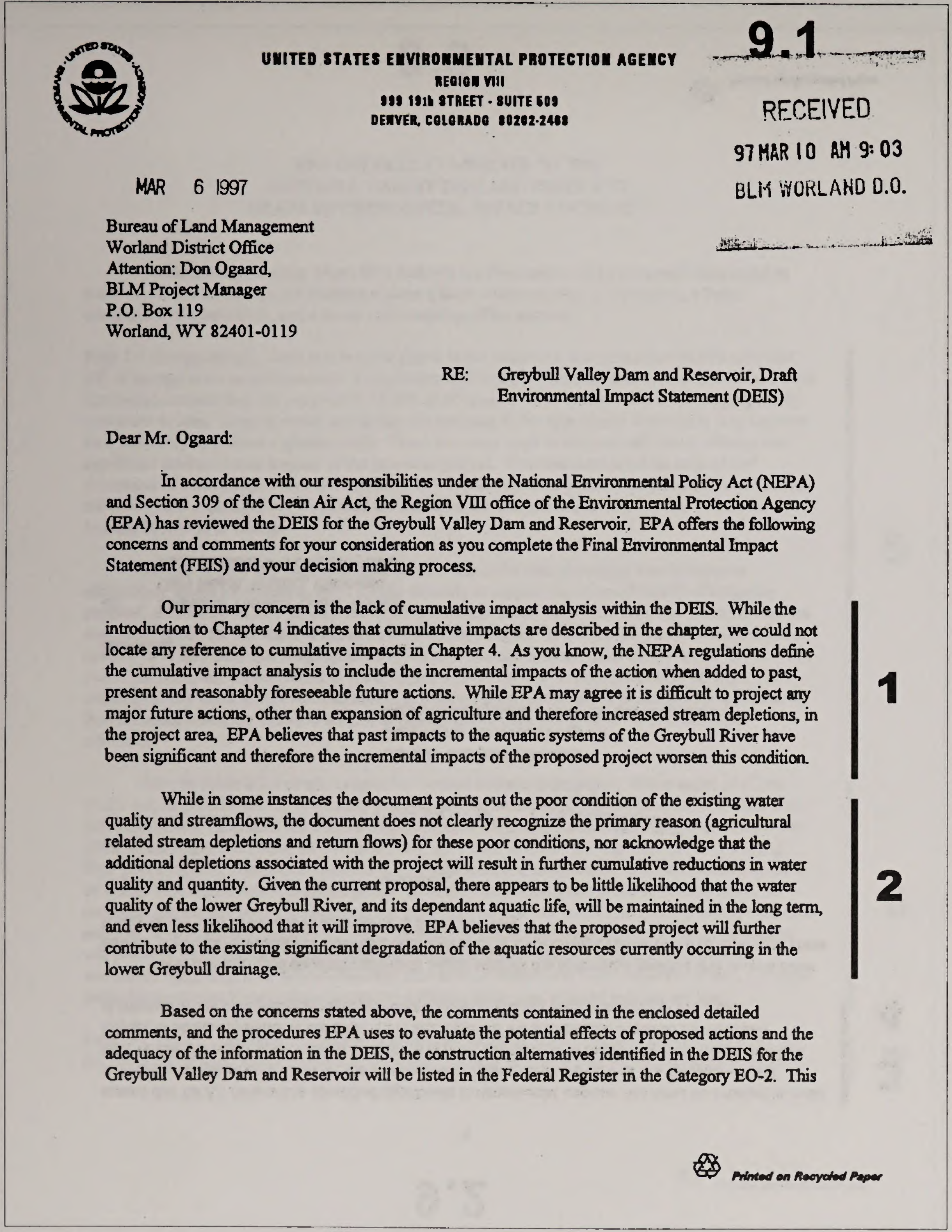
Lawrence M. Besson

Lewrence M. Besson
Director

GREY085.WP6

Letter 8
Water Development Commission - March 4, 1997

Thank you for your comments



9.1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

RECEIVED
97 MAR 10 AM 9:03
BLM WORLAND D.O.

MAR 6 1997

Bureau of Land Management
Worland District Office
Attention: Don Ogaard,
BLM Project Manager
P.O. Box 119
Worland, WY 82401-0119

RE: Greybull Valley Dam and Reservoir, Draft Environmental Impact Statement (DEIS)

Dear Mr. Ogaard:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Region VIII office of the Environmental Protection Agency (EPA) has reviewed the DEIS for the Greybull Valley Dam and Reservoir. EPA offers the following concerns and comments for your consideration as you complete the Final Environmental Impact Statement (FEIS) and your decision making process.

Our primary concern is the lack of cumulative impact analysis within the DEIS. While the introduction to Chapter 4 indicates that cumulative impacts are described in the chapter, we could not locate any reference to cumulative impacts in Chapter 4. As you know, the NEPA regulations define the cumulative impact analysis to include the incremental impacts of the action when added to past, present and reasonably foreseeable future actions. While EPA may agree it is difficult to project any major future actions, other than expansion of agriculture and therefore increased stream depletions, in the project area, EPA believes that past impacts to the aquatic systems of the Greybull River have been significant and therefore the incremental impacts of the proposed project worsen this condition. **1**

While in some instances the document points out the poor condition of the existing water quality and streamflows, the document does not clearly recognize the primary reason (agricultural related stream depletions and return flows) for these poor conditions, nor acknowledge that the additional depletions associated with the project will result in further cumulative reductions in water quality and quantity. Given the current proposal, there appears to be little likelihood that the water quality of the lower Greybull River, and its dependant aquatic life, will be maintained in the long term, and even less likelihood that it will improve. EPA believes that the proposed project will further contribute to the existing significant degradation of the aquatic resources currently occurring in the lower Greybull drainage. **2**

Based on the concerns stated above, the comments contained in the enclosed detailed comments, and the procedures EPA uses to evaluate the potential effects of proposed actions and the adequacy of the information in the DEIS, the construction alternatives identified in the DEIS for the Greybull Valley Dam and Reservoir will be listed in the Federal Register in the Category EO-2. This

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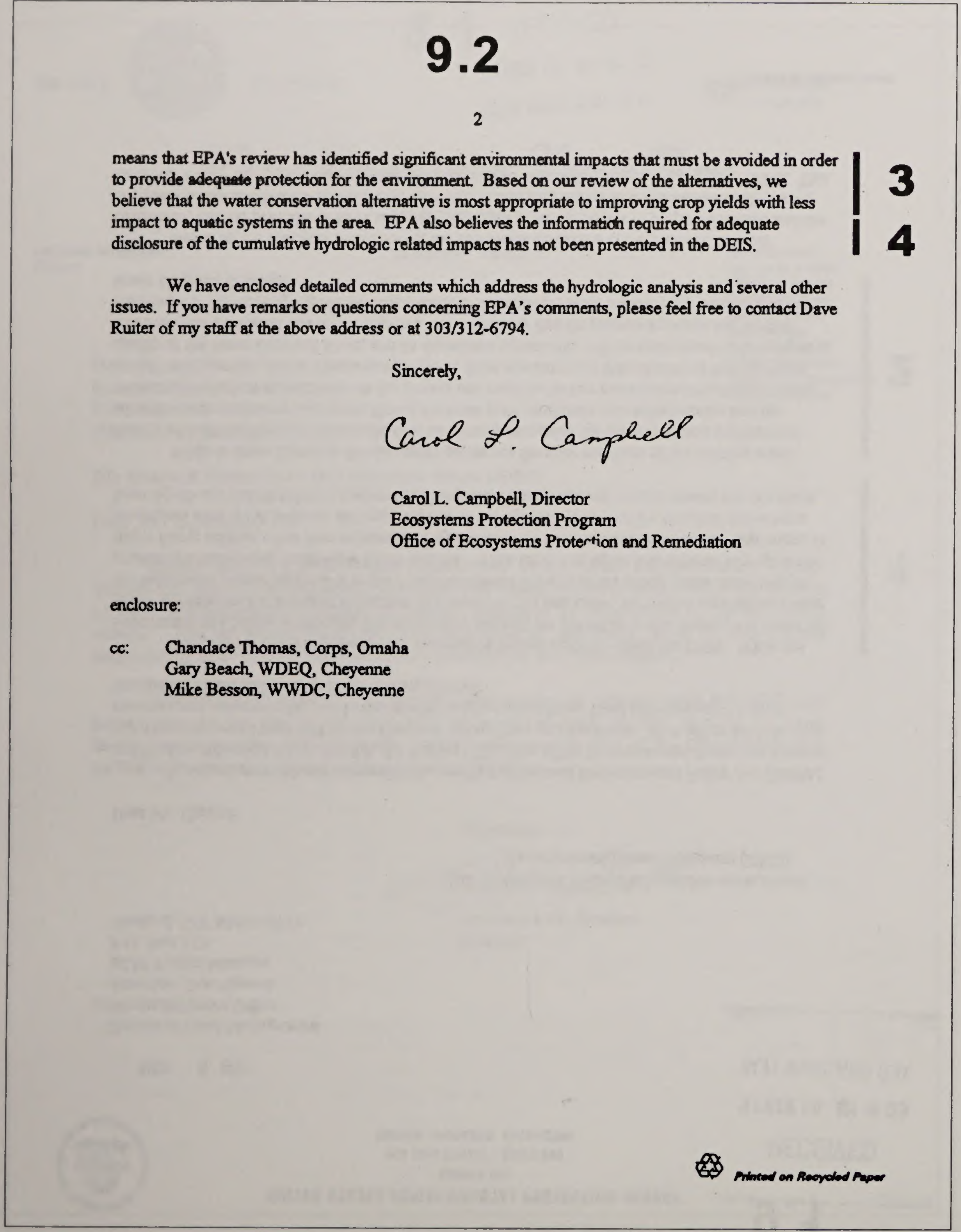
Letter 9
U.S. Environmental Protection Agency - March 6, 1997

1. Section 4.16 CUMULATIVE IMPACTS has been added to consolidate cumulative impacts analyses conducted for the EIS (see CHAPTER 2.0 ADDITIONS AND ERRATA). Stream conditions were analyzed in great detail (see WEST 1996b). The results of the analysis, based on all available information and conditions (past and present conditions of a cumulative effects analysis), indicate that conditions in the Greybull River aquatic ecosystem are likely to improve as a result of the project.

   Additional hydrologic analysis and summaries of previous analyses are included in the responses to EPA detailed comments below and in CHAPTER 2.0. In general, the available data, although limited, indicate the project will have a positive effect on both water quantity and water quality in the Greybull River. Improvements in water quantity and quality in the lower Greybull River valley will occur because the project is primarily designed to allow better management of existing water resources on existing irrigated lands rather than to allow additional lands to be put into production. Approximately 17,200 acres of lands in the basin that were once irrigated from the Greybull River have been taken out of production primarily because of inadequate water supplies. Implementation of this project will, at best, allow only a small portion of these lands to be put back into production because irrigation water shortages are large, particularly in dry years, for currently irrigated lands and this project is designed to reduce these shortages.



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means that EPA's review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Based on our review of the alternatives, we believe that the water conservation alternative is most appropriate to improving crop yields with less impact to aquatic systems in the area. **3** EPA also believes the information required for adequate disclosure of the cumulative hydrologic related impacts has not been presented in the DEIS. **4**

We have enclosed detailed comments which address the hydrologic analysis and several other issues. If you have remarks or questions concerning EPA's comments, please feel free to contact Dave Ruiter of my staff at the above address or at 303/312-6794.

Sincerely,

Carol L. Campbell

Carol L. Campbell, Director
Ecosystems Protection Program
Office of Ecosystems Protection and Remediation

enclosure:

cc: Chandace Thomas, Corps, Omaha
Gary Beach, WDEQ, Cheyenne
Mike Besson, WWDC, Cheyenne

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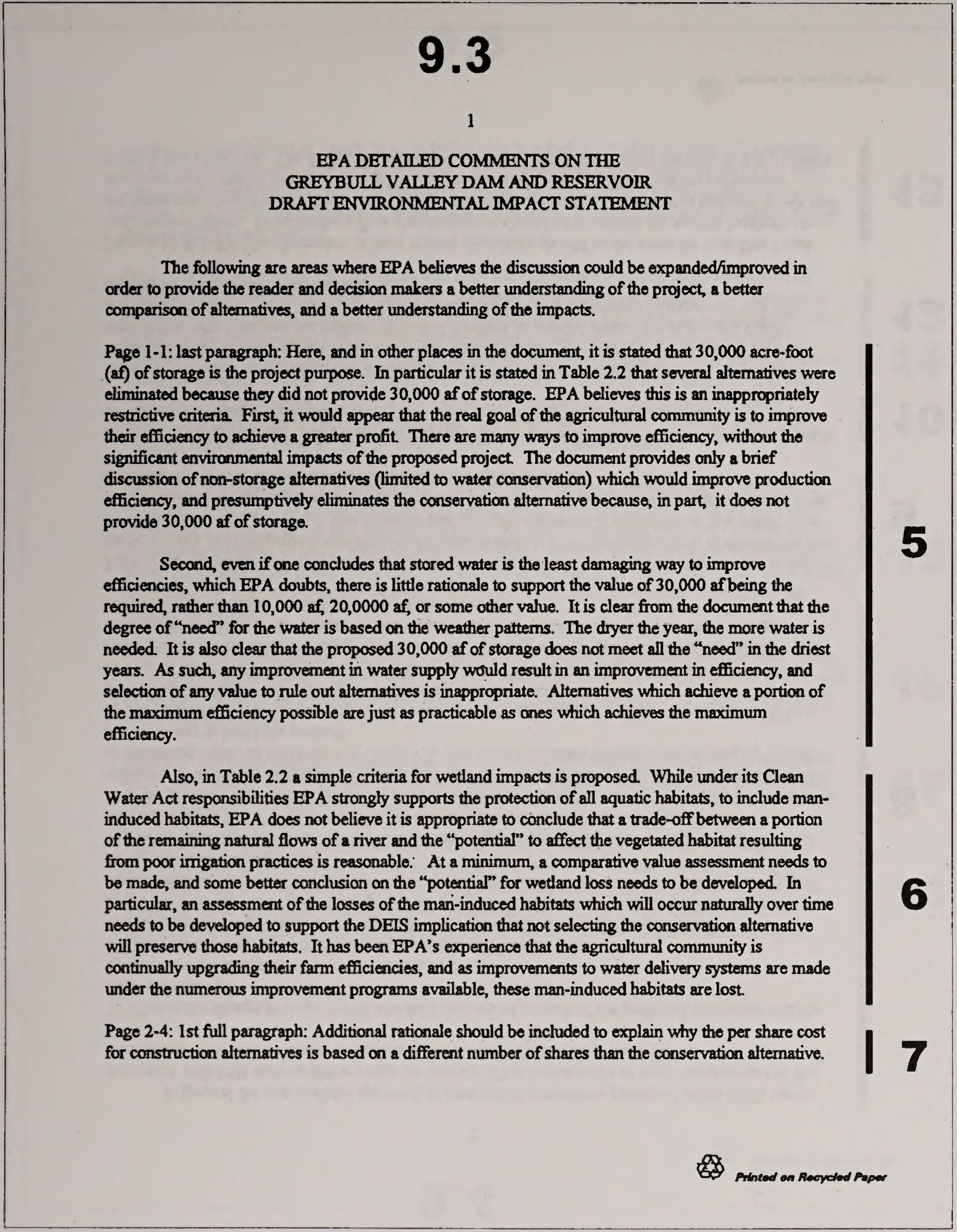
Further expansion of agriculture, even with the project, is still limited by available water supplies and is not likely to change unless the overall water supply in the Greybull River basin increases. Therefore, cumulative impacts of past, present, and foreseeable future actions are limited by the available water and are adequately projected by the analyses in the DEIS. No reasonably foreseeable future projects were identified in the project area. However, it is recognized that irrigators will likely continue to improve the efficiency of irrigation practices which may reduce or eliminate man caused wetlands in the future.

2. Agriculture has certainly had an impact on flows in the Greybull River. However, whether this impact is negative or positive depends on the aquatic species of concern. Based on the historical data provided in CHAPTER 2.0 it is clear that the irrigation system in place in the river basin has increased minimum flows and reduced TDS. Analysis of TDS as an indicator of water quality from historical stream records, indicate that on average TDS in the Greybull River declined after the construction and operation of Lower Sunshine Reservoir (see page 4-21, Section 4.3.2.1 Total Dissolved Solids). Results of the analysis indicated that the proposed project should not increase TDS. Results of the hydrological modeling (WEST 1996b) indicated that water quantity in the Greybull River will likely increase on average due to increase return flows, increased efficiency and improved utilization of irrigation water, and mitigation measures that will be employed to benefit aquatic life in the river (e.g. minimum 50 cfs in stream flow). Finally, water quality is regulated under the WDEQ 401 permit process. Under this process, measures are in place to insure minimal adverse effects to water quality.



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EPA DETAILED COMMENTS ON THE
GREYBULL VALLEY DAM AND RESERVOIR
DRAFT ENVIRONMENTAL IMPACT STATEMENT

The following are areas where EPA believes the discussion could be expanded/improved in order to provide the reader and decision makers a better understanding of the project, a better comparison of alternatives, and a better understanding of the impacts.

Page 1-1: last paragraph: Here, and in other places in the document, it is stated that 30,000 acre-foot (af) of storage is the project purpose. In particular it is stated in Table 2.2 that several alternatives were eliminated because they did not provide 30,000 af of storage. EPA believes this is an inappropriately restrictive criteria. First, it would appear that the real goal of the agricultural community is to improve their efficiency to achieve a greater profit. There are many ways to improve efficiency, without the significant environmental impacts of the proposed project. The document provides only a brief discussion of non-storage alternatives (limited to water conservation) which would improve production efficiency, and presumptively eliminates the conservation alternative because, in part, it does not provide 30,000 af of storage.

Second, even if one concludes that stored water is the least damaging way to improve efficiencies, which EPA doubts, there is little rationale to support the value of 30,000 af being the required, rather than 10,000 af, 20,0000 af, or some other value. It is clear from the document that the degree of "need" for the water is based on the weather patterns. The dryer the year, the more water is needed. It is also clear that the proposed 30,000 af of storage does not meet all the "need" in the driest years. As such, any improvement in water supply would result in an improvement in efficiency, and selection of any value to rule out alternatives is inappropriate. Alternatives which achieve a portion of the maximum efficiency possible are just as practicable as ones which achieves the maximum efficiency. **5**

Also, in Table 2.2 a simple criteria for wetland impacts is proposed. While under its Clean Water Act responsibilities EPA strongly supports the protection of all aquatic habitats, to include man-induced habitats, EPA does not believe it is appropriate to conclude that a trade-off between a portion of the remaining natural flows of a river and the "potential" to affect the vegetated habitat resulting from poor irrigation practices is reasonable. At a minimum, a comparative value assessment needs to be made, and some better conclusion on the "potential" for wetland loss needs to be developed. In particular, an assessment of the losses of the man-induced habitats which will occur naturally over time needs to be developed to support the DEIS implication that not selecting the conservation alternative will preserve those habitats. It has been EPA's experience that the agricultural community is continually upgrading their farm efficiencies, and as improvements to water delivery systems are made under the numerous improvement programs available, these man-induced habitats are lost. **6**

Page 2-4: 1st full paragraph: Additional rationale should be included to explain why the per share cost for construction alternatives is based on a different number of shares than the conservation alternative. **7**

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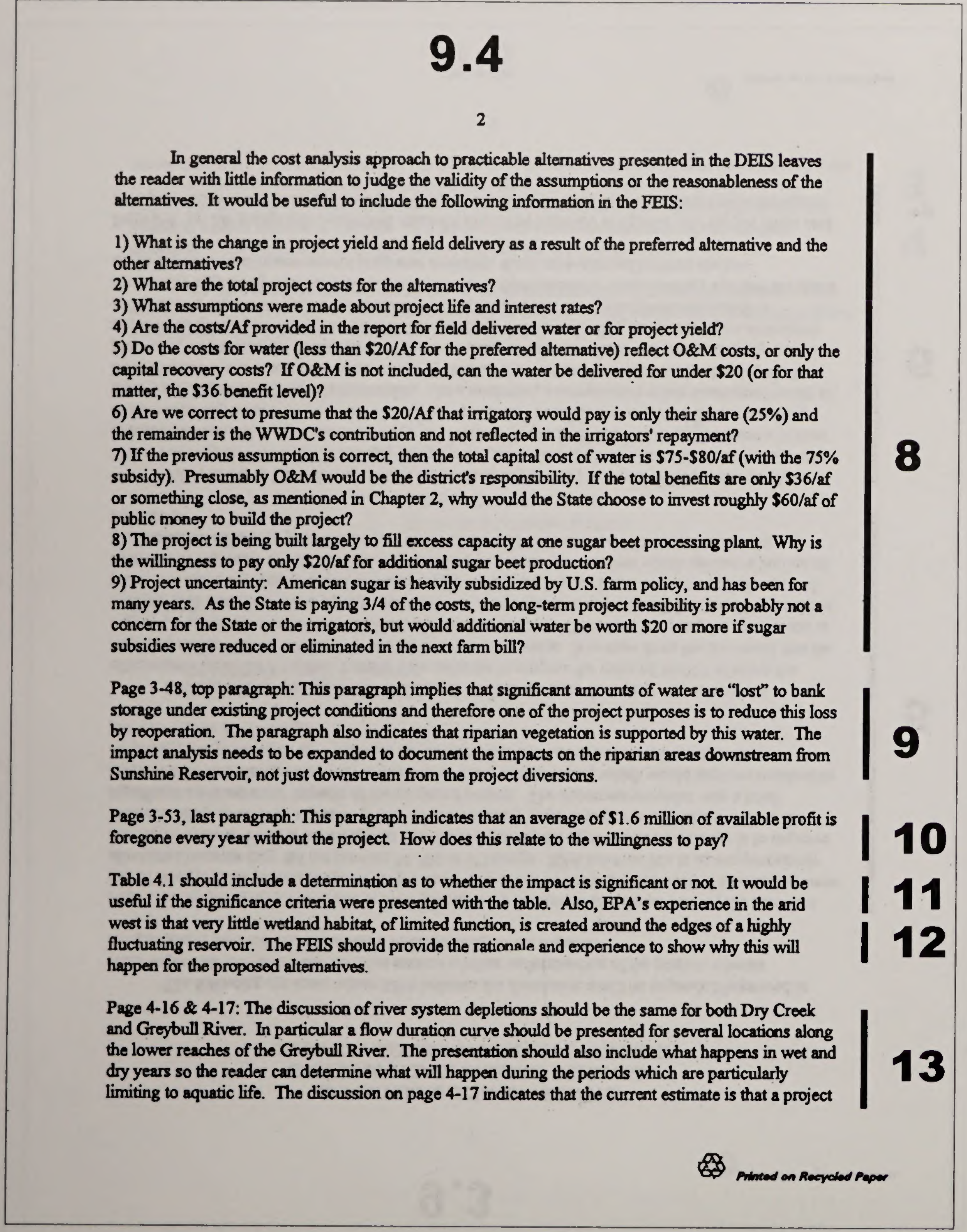
To further address water quality concerns, a study was undertaken to address the potential for selenium accumulation in the reservoir. Results of this study are presented under responses to letter 5 and Appendix F.

3. The conservation alternative would have the greatest impact on wetlands in the Greybull River Valley. Return flows from current irrigation practices in the valley have resulted in numerous wetlands around irrigation canals and in the floodplain of the Greybull River. Functionally, these wetlands are very important to water quality and wildlife in the area. Conservation practices would effectively "dry-up" hundreds of acres of wetlands in the Greybull River Valley. It is, however, recognized that some of the wetlands created by irrigation will lost as irrigation practices become more efficient. Additionally, the per share cost of the 11,500 AF provided by the conservation alternative would be prohibitive and results in the Conservation Alternative effectively becoming a no action alternative.

4. The BLM and Corps disagree with this comment and feel that information required for adequate disclosure of the hydrologic related impacts is provided in the DEIS and supporting technical reports. Detailed hydrological and wetland investigations reports were prepared consistent with the NEPA process to analyze, describe, and disclose all foreseeable effects on the aquatic ecosystem of the Greybull River from project implementation (WEST 1996b, 1996c). These reports are available, as is the DEIS and other supporting documentation, to all interested parties.



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In general the cost analysis approach to practicable alternatives presented in the DEIS leaves the reader with little information to judge the validity of the assumptions or the reasonableness of the alternatives. It would be useful to include the following information in the FEIS:

1) What is the change in project yield and field delivery as a result of the preferred alternative and the other alternatives?
2) What are the total project costs for the alternatives?
3) What assumptions were made about project life and interest rates?
4) Are the costs/Af provided in the report for field delivered water or for project yield?
5) Do the costs for water (less than $20/Af for the preferred alternative) reflect O&M costs, or only the capital recovery costs? If O&M is not included, can the water be delivered for under $20 (or for that matter, the $36 benefit level)?
6) Are we correct to presume that the $20/Af that irrigators would pay is only their share (25%) and the remainder is the WWDC's contribution and not reflected in the irrigators' repayment?
7) If the previous assumption is correct, then the total capital cost of water is $75-$80/af (with the 75% subsidy). Presumably O&M would be the district's responsibility. If the total benefits are only $36/af or something close, as mentioned in Chapter 2, why would the State choose to invest roughly $60/af of public money to build the project? **8**
8) The project is being built largely to fill excess capacity at one sugar beet processing plant. Why is the willingness to pay only $20/af for additional sugar beet production?
9) Project uncertainty: American sugar is heavily subsidized by U.S. farm policy, and has been for many years. As the State is paying 3/4 of the costs, the long-term project feasibility is probably not a concern for the State or the irrigators, but would additional water be worth $20 or more if sugar subsidies were reduced or eliminated in the next farm bill?

Page 3-48, top paragraph: This paragraph implies that significant amounts of water are "lost" to bank storage under existing project conditions and therefore one of the project purposes is to reduce this loss by reoperation. The paragraph also indicates that riparian vegetation is supported by this water. The impact analysis needs to be expanded to document the impacts on the riparian areas downstream from Sunshine Reservoir, not just downstream from the project diversions. **9**

Page 3-53, last paragraph: This paragraph indicates that an average of $1.6 million of available profit is foregone every year without the project. How does this relate to the willingness to pay? **10**

Table 4.1 should include a determination as to whether the impact is significant or not. It would be useful if the significance criteria were presented with the table. **11** Also, EPA's experience in the arid west is that very little wetland habitat, of limited function, is created around the edges of a highly fluctuating reservoir. The FEIS should provide the rationale and experience to show why this will happen for the proposed alternatives. **12**

Page 4-16 & 4-17: The discussion of river system depletions should be the same for both Dry Creek and Greybull River. In particular a flow duration curve should be presented for several locations along the lower reaches of the Greybull River. The presentation should also include what happens in wet and dry years so the reader can determine what will happen during the periods which are particularly limiting to aquatic life. The discussion on page 4-17 indicates that the current estimate is that a project **13**

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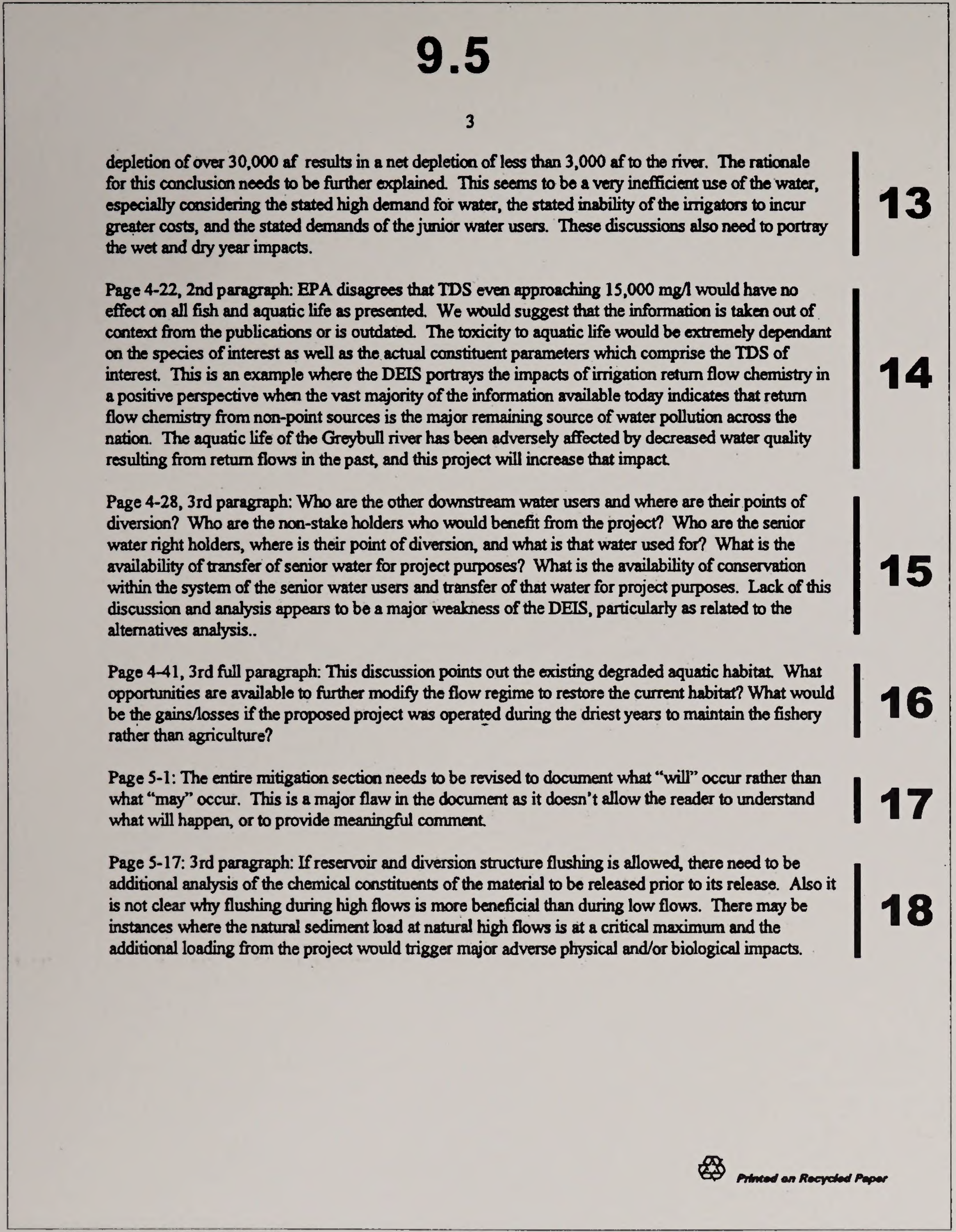
5. The DEIS clearly illustrates that to maximize the efficiency of farming by eliminating all irrigation water shortages on currently irrigated lands in the Greybull River Valley would require a project yield in excess of 41,000 AF. The project need was established by evaluating a number of alternatives to find the project which reduced shortages to the maximum extent possible while still meeting the irrigators ability to finance the project. This need has been substantiated though the sale of the majority of the 26,500 shares in the project that have been offered for sale.

6. The BLM and Corps do not agree with the implication that man-induced wetlands should be dismissed as unimportant to the environment in the project area. A comparative value assessment was performed during preparation of the DEIS to evaluate wetland impacts and is presented in Section 4.6.1 WETLANDS. Further analysis is presented in WEST 1996c. Many of the wetlands along the Greybull River riparian corridor are at least partially the result of irrigation return flow. Increased irrigation in the valley will increase returns flows and undoubtedly the amount of wetland along the river. However, it is recognized that over the long term, many of these wetlands may "dry-up" as irrigation practices improve. It is also true that natural wetlands "dry-up" and new ones are created with changes in the river hydrology. The transient nature of wetlands does not reduce their present value to the environment.

The BLM and Corps disagree with the suggestion that the 1.15 acre of river induced wetland that may be impacted by the project and which will be mitigated should be preserved at the cost of potentially hundreds of acres of man induced wetlands. Impacts to wildlife, vegetation, soils, groundwater, return flows to the



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depletion of over 30,000 af results in a net depletion of less than 3,000 af to the river. The rationale for this conclusion needs to be further explained. This seems to be a very inefficient use of the water, especially considering the stated high demand for water, the stated inability of the irrigators to incur greater costs, and the stated demands of the junior water users. These discussions also need to portray the wet and dry year impacts. **13**

Page 4-22, 2nd paragraph: EPA disagrees that TDS even approaching 15,000 mg/l would have no effect on all fish and aquatic life as presented. We would suggest that the information is taken out of context from the publications or is outdated. The toxicity to aquatic life would be extremely dependant on the species of interest as well as the actual constituent parameters which comprise the TDS of interest. This is an example where the DEIS portrays the impacts of irrigation return flow chemistry in a positive perspective when the vast majority of the information available today indicates that return flow chemistry from non-point sources is the major remaining source of water pollution across the nation. The aquatic life of the Greybull river has been adversely affected by decreased water quality resulting from return flows in the past, and this project will increase that impact. **14**

Page 4-28, 3rd paragraph: Who are the other downstream water users and where are their points of diversion? Who are the non-stake holders who would benefit from the project? Who are the senior water right holders, where is their point of diversion, and what is that water used for? What is the availability of transfer of senior water for project purposes? What is the availability of conservation within the system of the senior water users and transfer of that water for project purposes. Lack of this discussion and analysis appears to be a major weakness of the DEIS, particularly as related to the alternatives analysis.. **15**

Page 4-41, 3rd full paragraph: This discussion points out the existing degraded aquatic habitat. What opportunities are available to further modify the flow regime to restore the current habitat? What would be the gains/losses if the proposed project was operated during the driest years to maintain the fishery rather than agriculture? **16**

Page 5-1: The entire mitigation section needs to be revised to document what "will" occur rather than what "may" occur. This is a major flaw in the document as it doesn't allow the reader to understand what will happen, or to provide meaningful comment. **17**

Page 5-17: 3rd paragraph: If reservoir and diversion structure flushing is allowed, there need to be additional analysis of the chemical constituents of the material to be released prior to its release. Also it is not clear why flushing during high flows is more beneficial than during low flows. There may be instances where the natural sediment load at natural high flows is at a critical maximum and the additional loading from the project would trigger major adverse physical and/or biological impacts. **18**

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river, biodiversity, and socioeconomics would likely be significant.

7. See page 2-4 and 2-8 of the DEIS. Under the conservation alternative only 11,500 AF would be available.

8. The reviewer provides a list of suggested additions for the FEIS. Responses to the questions follow. Further, discussion of socioeconomic issues raised are provided in Appendix G.

1) The BLM and Corps feel this information is adequately covered for alternatives evaluated in detail.
2) See pages 4-55 and 4-62 and Appendix G.
3) No explicit analysis of project life was performed. The present value of project benefits (see page 4-62, DEIS) was computed using the conservative assumption of a 50-year project life and real discount rate of four percent (see Appendix G).
4) The cost figures used in the report refer to the cost of one share of reservoir storage, where one share represents a proportion of the reservoirs storage contents and a proportion of the reservoirs cost (see Appendix G).
5)The costs for water reported in the DEIS do not include O&M costs.
6) Yes (see page 2-4, first full paragraph).
7) WWDC guidelines for project evaluation do not require strict adherence to national economic development efficiency guidelines but place heavy emphasis upon indirect and intangible project benefits. See Appendix G. Evaluating the logic of State economic policy is beyond the scope of the decision being made by the BLM and Corps. Also, see Letter 8.

8) See page 4-60, Figure 4.3. Because the majority of GVID members do not anticipate increasing their sugar beet production, average willingness-to-pay is lower than might be the case if all project water were going to be used for sugar beet production. Also see Appendix G.
9) Cost evaluation for the purpose and need for the project was based on responses of benefactors of the project which presumably reflects the "worth" of the water to the local farming community. See Appendix G.

9. The amount of water in bank storage cannot be managed by construction of the project except in a very limited way by managing some of the peak flows in the river. Section 4.7.3 EXISTING IRRIGATION SYSTEM has been added to address the effects of bank storage (see CHAPTER 2.0).

10. The project would yield an average of 23,500 acre-feet of irrigation water annually. Multiplying that figure by a $20 per acre-foot willingness-to-pay estimate yields a total annual willingness-to-pay estimate of $470,000. See Appendix G for further analyses.

11. The determination of significance and significance criteria are resource specific. Table 4.1 lists potential effects identified based on the analyses conducted. Only those impacts considered significant were identified for mitigation. Table 4.1 has been revised to show which effects require mitigation.

12. See page 2-9, Table 2.2 and page 4-33, second full paragraph.

13. Daily streamflow data required for preparing flow duration curves are available for only one location along the lower reaches of the Greybull River (Greybull River near Basin USGS station). Data were collected at this station from 1931 through 1973 when the station was discontinued. Figure 2-2 shows flow duration curves prepared from the available data for this station. See CHAPTER 2.0 ADDITIONS AND ERRATA for additional stream flow information and discussion added to the EIS.

14. See section 4.3.2.1 Total Dissolved Solids. The available data on water quality (obtained from the EPA STORET database) indicates that water quality, in terms of TDS, did not significantly change during high and medium streamflow and improved during low flows as a result of operation of Lower Sunshine Reservoir. Reasons for this are discussed on page 4-21. Effects of operation of Lower Roach Gulch Reservoir will be approximately the same although the effects will be smaller due to the smaller increase in irrigation as a result of reservoir operation. See CHAPTER 2.0 ADDITIONS AND ERRATA for additional information and discussion about water quality added to the EIS.

15. Other downstream water users consist of owners of ditches and canals downstream of the reservoir. See CHAPTER 2.0 ADDITIONS AND ERRATA and responses to letter 4 for additional discussion of water rights issues.

As discussed in the DEIS, conservation is not a realistic option for increasing water supplies in the lower Greybull River Valley. Return flows are already extensively reused within the basin and reducing conveyance and application losses on a portion of the irrigated lands would, in most cases, increase shortages for those water users that rely on return flows for part of their supply. Additional environmental effects would also occur, in particular loss of wetlands created by ditch and canal system seepage and drainage of irrigated lands as well as reductions in streamflow resulting from reduced return flows. The cost of conservation efforts, even assuming that additional water could be found to mitigate the environmental effects, is much greater than the cost of improving the efficiency of the existing system by adding additional storage.

16. Returning the habitat to pre-irrigation conditions would likely result in periodic dewatering of the river. If the project were managed to maximize trout production, a situation very unlike pre-irrigation conditions, the purpose and need for the project would not be met. The agreement between the WWDC, GVID, and WGFD which presumably improves the fishery in the valley, is provided in Appendix E.

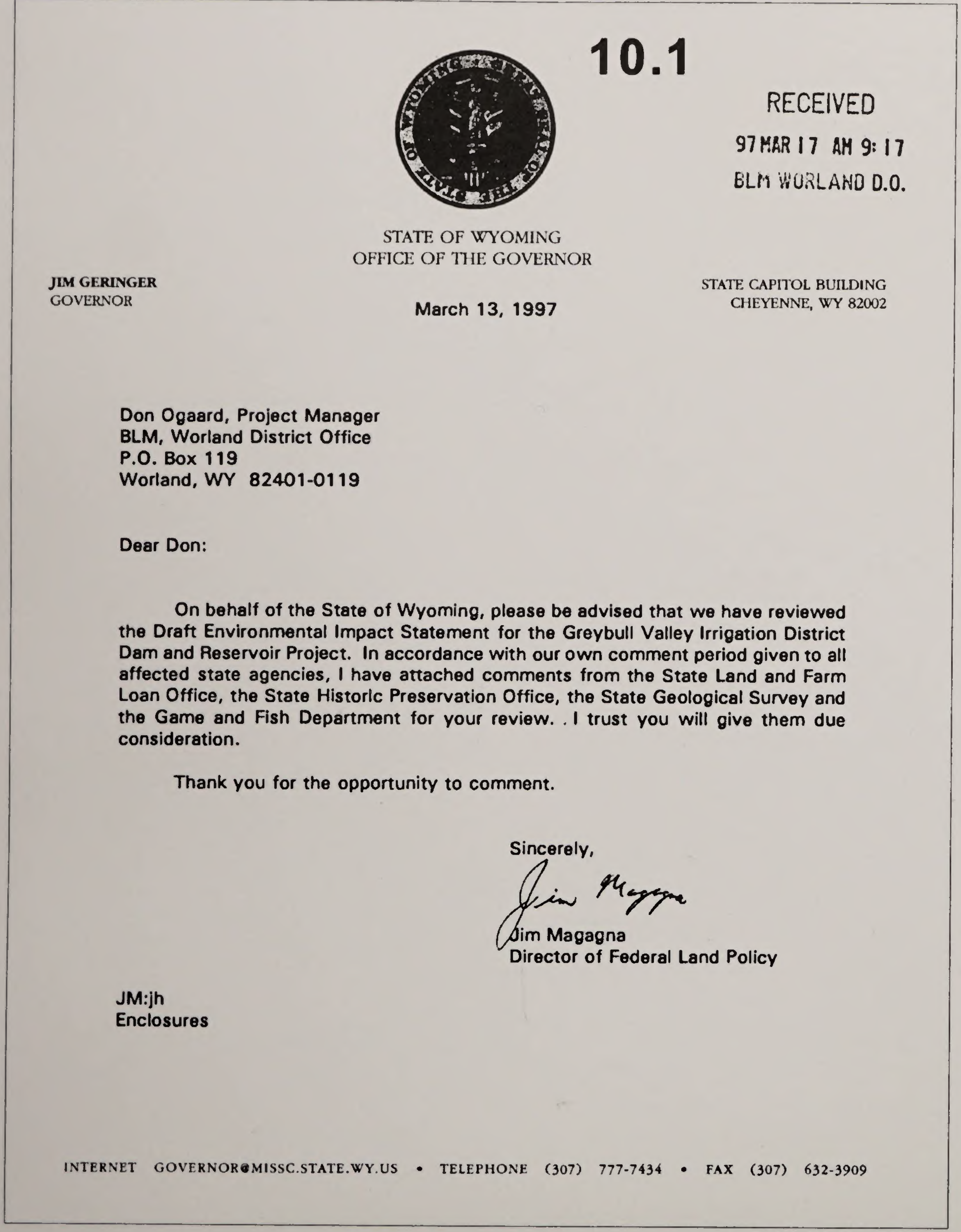
17. The DEIS was prepared according to the NEPA guidance of the BLM. The DEIS is not a decision document. Mitigation presented in the DEIS are suggested measures that can be taken to reduce or eliminate potential impacts from the project to help the decision makers with the ROD. The ROD will identify specific mitigation measures that will be employed and will use the appropriate semantics.

18. As stated in the DEIS, the reservoir will not be flushed unless storage of water for later release is considered flushing. The reservoir has been designed with a large dead pool for sediment storage that can be enlarged, if necessary, to provide additional

sediment storage (GEI 1994a). The design does not anticipate any sediment flushing from the reservoir.

The diversion dam could potentially trap some sediment from natural flows in the river as water is diverted into the diversion canal. The diversion has been designed to maintain adequate velocities in the main channel of the Greybull River to pass most sediment through the structure. Flushing of the small amounts of sediment that may accumulate upstream of the diversion structure during high flows when natural sediment loading in the river is high was suggested by the Wyoming Department of Environmental Quality, Water Quality Division. Suspended sediment standards in Wyoming are enforced by measuring turbidity upstream and downstream of a suspected violation. Flushing of sediment when natural turbidity in the river is high may allow discharge of the sediment without violating turbidity standards. If it is found that flushing the sediment may violate turbidity standards, any accumulated sediment could be removed during low flows by diverting flows away from the areas of sediment accumulation and removing the material with construction equipment.

Any sediment that accumulates upstream of the diversion structure will be fine sands and silts that have been carried in the natural flows of the Greybull River. It is unlikely that this material will contain any deleterious substances unless a large spill has occurred upstream of the diversion structure. Although, our analysis suggests that small amounts of selenium might accumulate in sediment if flushing does not occur. Analysis of the sediment will not be necessary except in the event of a release of hazardous material into the Greybull River upstream.



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BLM WORLAND D.O.

STATE OF WYOMING
OFFICE OF THE GOVERNOR

JIM GERINGER
GOVERNOR

STATE CAPITOL BUILDING
CHEYENNE, WY 82002

March 13, 1997

Don Ogaard, Project Manager
BLM, Worland District Office
P.O. Box 119
Worland, WY 82401-0119

Dear Don:

On behalf of the State of Wyoming, please be advised that we have reviewed the Draft Environmental Impact Statement for the Greybull Valley Irrigation District Dam and Reservoir Project. In accordance with our own comment period given to all affected state agencies, I have attached comments from the State Land and Farm Loan Office, the State Historic Preservation Office, the State Geological Survey and the Game and Fish Department for your review. . I trust you will give them due consideration.

Thank you for the opportunity to comment.

Sincerely,

Jim Magagna

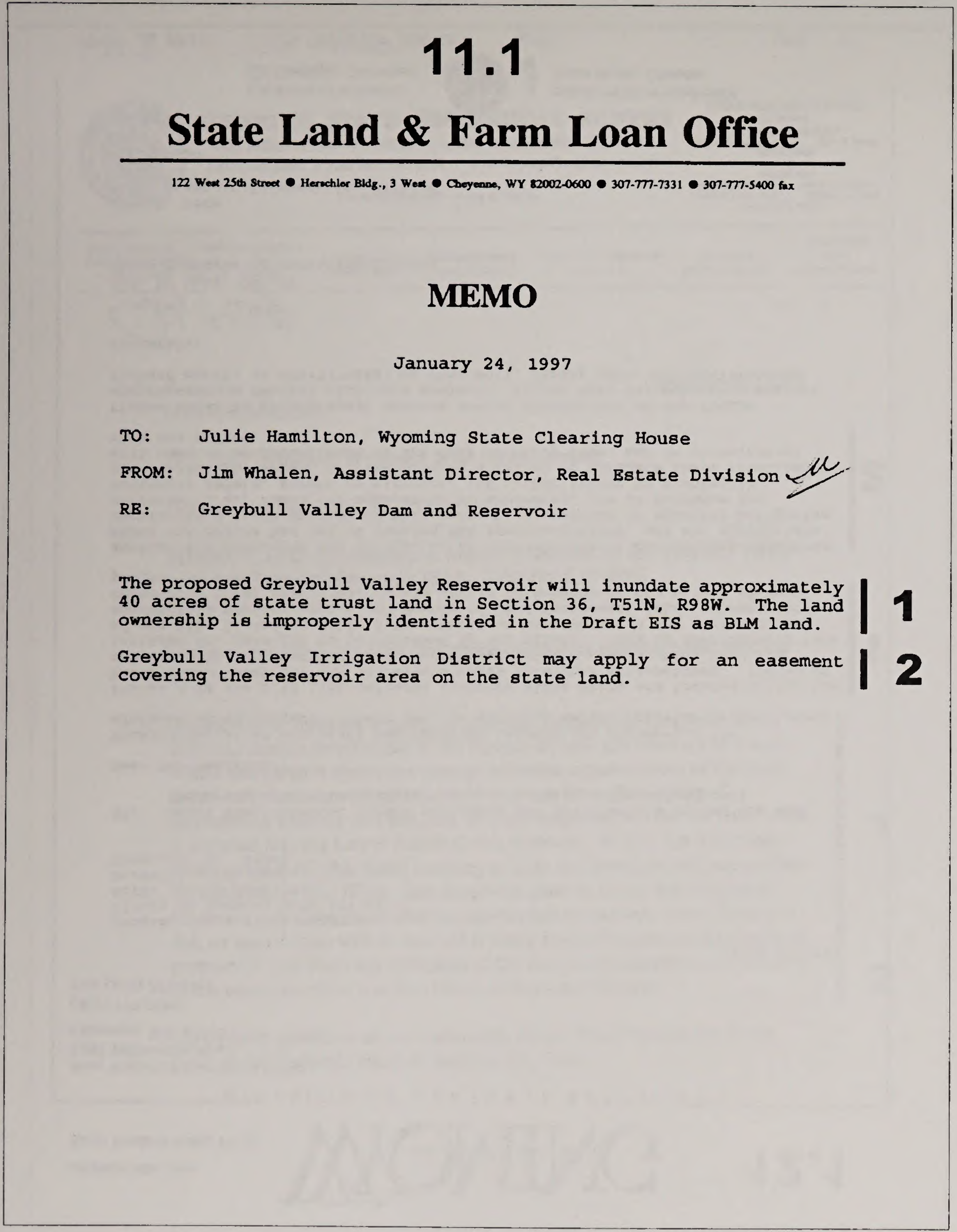
Jim Magagna
Director of Federal Land Policy

JM:jh
Enclosures

INTERNET GOVERNOR@MISSC.STATE.WY.US • TELEPHONE (307) 777-7434 • FAX (307) 632-3909

Letter 10
State of Wyoming, Office of the Governor - March 13, 1997

Thank you for forwarding the comment letters as indicated. Comments from these agencies are duly addressed in this document.



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State Land & Farm Loan Office

122 West 25th Street ● Herschler Bldg., 3 West ● Cheyenne, WY 82002-0600 ● 307-777-7331 ● 307-777-5400 fax

MEMO

January 24, 1997

TO: Julie Hamilton, Wyoming State Clearing House

FROM: Jim Whalen, Assistant Director, Real Estate Division

RE: Greybull Valley Dam and Reservoir

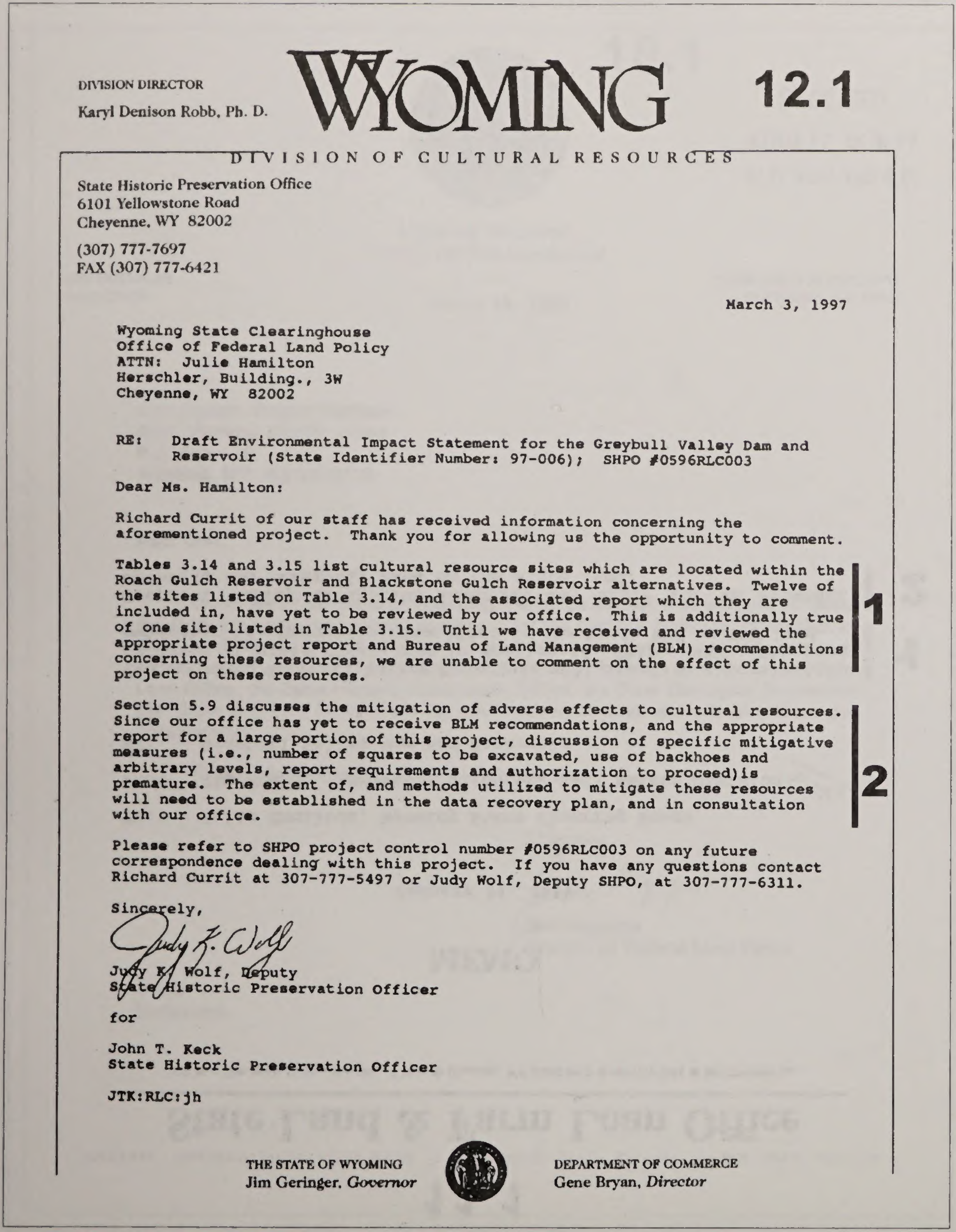
The proposed Greybull Valley Reservoir will inundate approximately 40 acres of state trust land in Section 36, T51N, R98W. The land ownership is improperly identified in the Draft EIS as BLM land. 1

Greybull Valley Irrigation District may apply for an easement covering the reservoir area on the state land. 2

Letter 11
State Land & Farm Loan Office - January 24, 1997

1. Figure IV in the Executive Summary and Figure 2.3 have been edited to reflect the correct landownership for T. 51 N., R. 98 W., sec. 36 (see CHAPTER 2.0 ADDITIONS AND ERRATA).

2. The GVID will apply for an easement for the portion of the reservoir on the State Land. Table 4.1 has been edited to reflect additional permit needs.



DIVISION DIRECTOR
Karyl Denison Robb, Ph. D.

WYOMING

DIVISION OF CULTURAL RESOURCES

State Historic Preservation Office
6101 Yellowstone Road
Cheyenne, WY 82002

(307) 777-7697
FAX (307) 777-6421

12.1

March 3, 1997

Wyoming State Clearinghouse
Office of Federal Land Policy
ATTN: Julie Hamilton
Herschler, Building., 3W
Cheyenne, WY 82002

RE: Draft Environmental Impact Statement for the Greybull Valley Dam and Reservoir (State Identifier Number: 97-006); SHPO #0596RLC003

Dear Ms. Hamilton:

Richard Currit of our staff has received information concerning the aforementioned project. Thank you for allowing us the opportunity to comment.

Tables 3.14 and 3.15 list cultural resource sites which are located within the Roach Gulch Reservoir and Blackstone Gulch Reservoir alternatives. Twelve of the sites listed on Table 3.14, and the associated report which they are included in, have yet to be reviewed by our office. This is additionally true of one site listed in Table 3.15. Until we have received and reviewed the appropriate project report and Bureau of Land Management (BLM) recommendations concerning these resources, we are unable to comment on the effect of this project on these resources. **1**

Section 5.9 discusses the mitigation of adverse effects to cultural resources. Since our office has yet to receive BLM recommendations, and the appropriate report for a large portion of this project, discussion of specific mitigative measures (i.e., number of squares to be excavated, use of backhoes and arbitrary levels, report requirements and authorization to proceed) is premature. The extent of, and methods utilized to mitigate these resources will need to be established in the data recovery plan, and in consultation with our office. **2**

Please refer to SHPO project control number #0596RLC003 on any future correspondence dealing with this project. If you have any questions contact Richard Currit at 307-777-5497 or Judy Wolf, Deputy SHPO, at 307-777-6311.

Sincerely,

Judy K. Wolf

Judy K. Wolf, Deputy
State Historic Preservation Officer

for

John T. Keck
State Historic Preservation Officer

JTK:RLC:jh

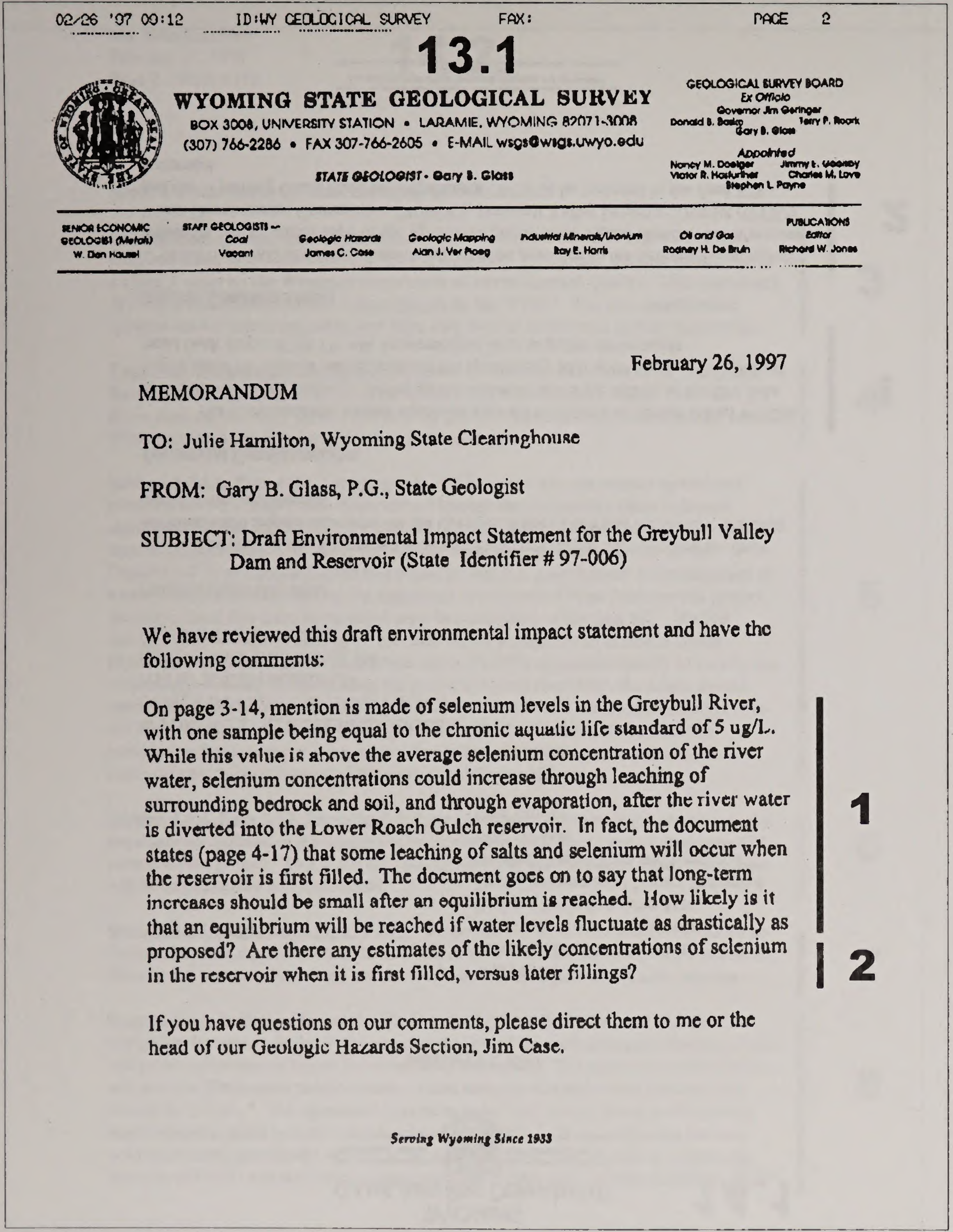
THE STATE OF WYOMING
Jim Geringer, *Governor*

DEPARTMENT OF COMMERCE
Gene Bryan, *Director*

Letter 12
State Historic Preservation Office - March 3, 1997

1. Cultural resource reports were provided to the State Historic Preservation Office.

2. Reports have been sent to SHPO. Mitigation measures are described in the data recovery plan for sites eligible for nomination to the National Register of Historic Places. Appropriate procedures will be followed to insure adequate protection of cultural resources.



02/26 '97 09:12 ID:WY GEOLOGICAL SURVEY FAX: PAGE 2

13.1

WYOMING STATE GEOLOGICAL SURVEY
BOX 3008, UNIVERSITY STATION • LARAMIE, WYOMING 82071-3008
(307) 766-2286 • FAX 307-766-2605 • E-MAIL wsgs@wsgs.uwyo.edu

STATE GEOLOGIST • Gary B. Glass

GEOLOGICAL SURVEY BOARD
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Geologic Mapping Alan J. Ver Ploeg
Industrial Minerals/Uranium Ray E. Harris
Oil and Gas Rodney H. De Bruin
PUBLICATIONS *Editor* Richard W. Jones

February 26, 1997

MEMORANDUM

TO: Julie Hamilton, Wyoming State Clearinghouse

FROM: Gary B. Glass, P.G., State Geologist

SUBJECT: Draft Environmental Impact Statement for the Greybull Valley Dam and Reservoir (State Identifier # 97-006)

We have reviewed this draft environmental impact statement and have the following comments:

On page 3-14, mention is made of selenium levels in the Greybull River,
with one sample being equal to the chronic aquatic life standard of 5 ug/L.
While this value is above the average selenium concentration of the river
water, selenium concentrations could increase through leaching of
surrounding bedrock and soil, and through evaporation, after the river water
is diverted into the Lower Roach Gulch reservoir. In fact, the document 1
states (page 4-17) that some leaching of salts and selenium will occur when
the reservoir is first filled. The document goes on to say that long-term
increases should be small after an equilibrium is reached. How likely is it
that an equilibrium will be reached if water levels fluctuate as drastically as
proposed? Are there any estimates of the likely concentrations of selenium 2
in the reservoir when it is first filled, versus later fillings?

If you have questions on our comments, please direct them to me or the head of our Geologic Hazards Section, Jim Case.

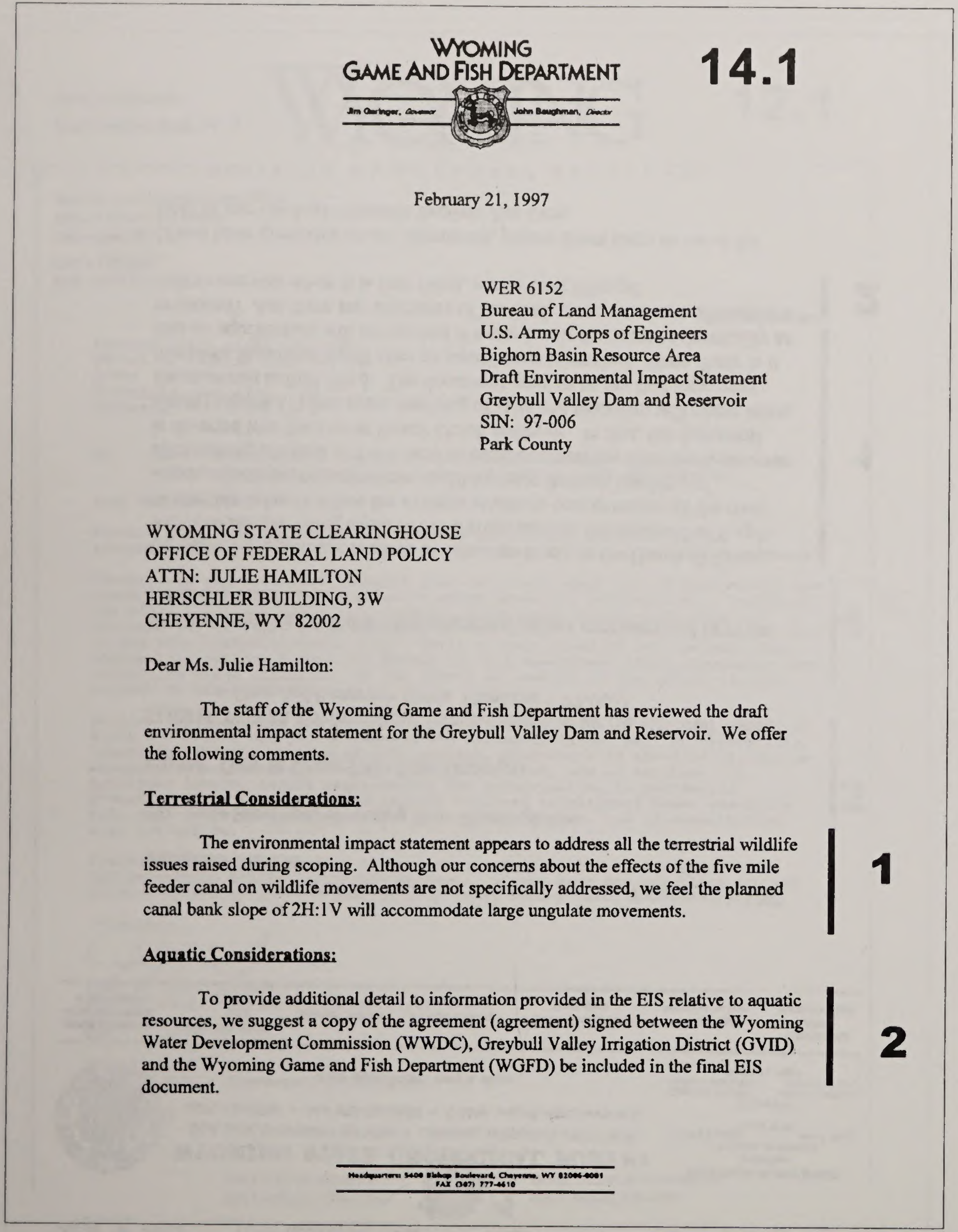
Serving Wyoming Since 1933

Letter 13
Wyoming State Geological Survey - February 26, 1997

1. Selenium accumulation has been found to be a problem in closed basins where evaporation can concentrate chemical constituents of runoff originating on selenium rich soils. One of the mitigation measures that has been proposed to alleviate this condition in areas where it is a problem is flushing of the basins with water containing lower selenium levels (Engberg and Cappellucci 1993). The operation of the proposed reservoir includes filling and emptying the reservoir on a nearly annual basis. Therefore, even if the Willwood Formation derived soils in the reservoir basin contained selenium in significant quantities, the operation of the reservoir would increase the likelihood that concentrations in the reservoir water do not become a problem. Also see responses to letter 5.

2. Selenium levels near or equal to the chronic aquatic life standard have been measured in the Greybull River. These selenium levels may be partially due to runoff from tributaries flowing on the Willwood Formation but it is far more likely that the source of the selenium is the Cody Shale which outcrops in the upper portion of the river basin. Cody Shale is a marine shale of Cretaceous age that has been associated with selenium accumulation problems elsewhere in Wyoming (Engberg and Cappellucci 1993).

   Water and sediment samples were taken from the diversion point on the Greybull River and from existing ponds located in the proposed reservoir sites and analyzed for selenium. Results of this study are presented in Appendix F.



WYOMING
GAME AND FISH DEPARTMENT
Jim Geringer, Governor
John Baughman, Director

14.1

February 21, 1997

WER 6152
Bureau of Land Management
U.S. Army Corps of Engineers
Bighorn Basin Resource Area
Draft Environmental Impact Statement
Greybull Valley Dam and Reservoir
SIN: 97-006
Park County

WYOMING STATE CLEARINGHOUSE
OFFICE OF FEDERAL LAND POLICY
ATTN: JULIE HAMILTON
HERSCHLER BUILDING, 3W
CHEYENNE, WY 82002

Dear Ms. Julie Hamilton:

The staff of the Wyoming Game and Fish Department has reviewed the draft environmental impact statement for the Greybull Valley Dam and Reservoir. We offer the following comments.

Terrestrial Considerations:

The environmental impact statement appears to address all the terrestrial wildlife issues raised during scoping. Although our concerns about the effects of the five mile feeder canal on wildlife movements are not specifically addressed, we feel the planned canal bank slope of 2H:1V will accommodate large ungulate movements. **1**

Aquatic Considerations:

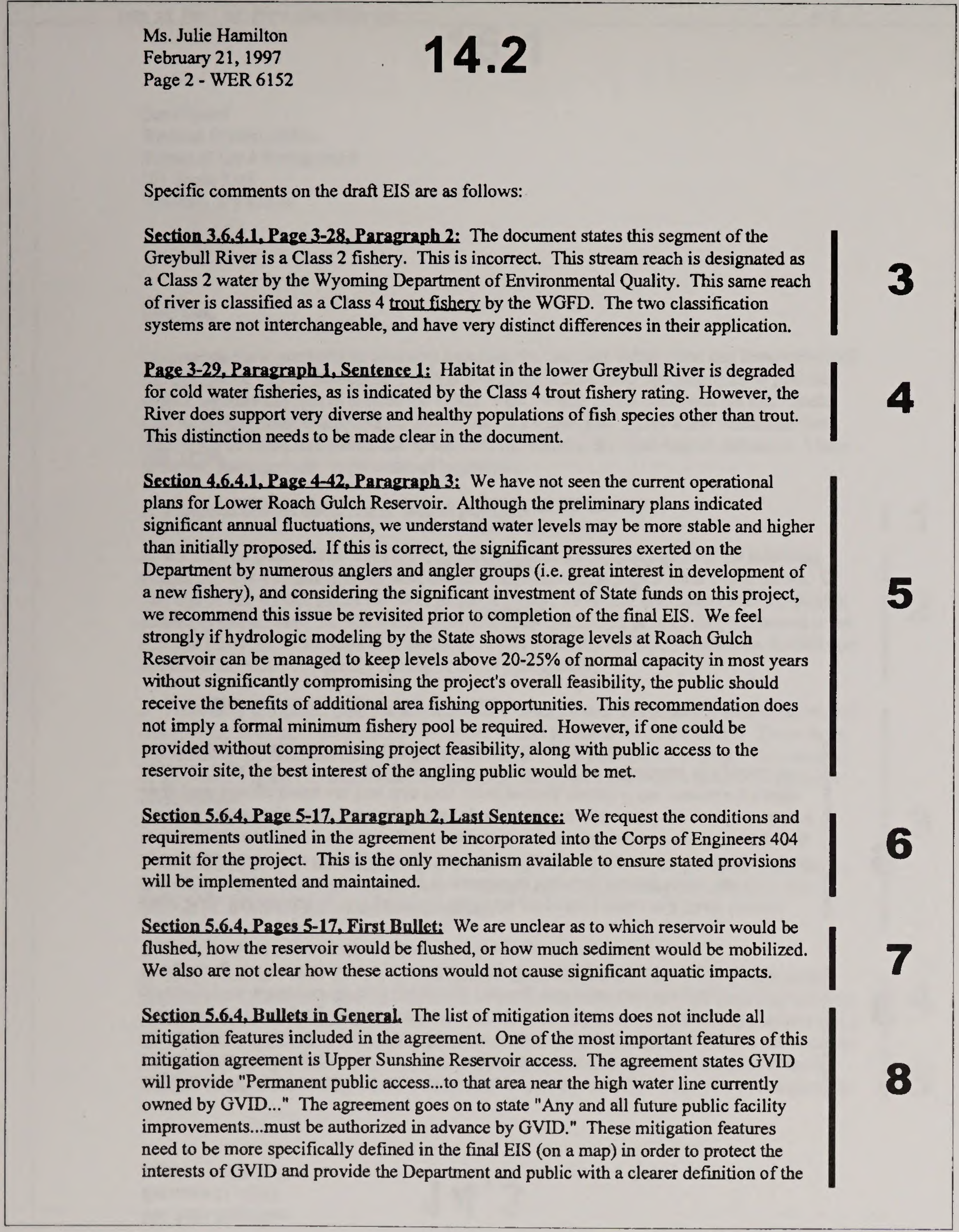
To provide additional detail to information provided in the EIS relative to aquatic resources, we suggest a copy of the agreement (agreement) signed between the Wyoming Water Development Commission (WWDC), Greybull Valley Irrigation District (GVID) and the Wyoming Game and Fish Department (WGFD) be included in the final EIS document. **2**

Headquarters: 5400 Bishop Boulevard, Cheyenne, WY 82006-0001
FAX (307) 777-4610

Letter 14
Wyoming Game and Fish Department - February 21, 1997

1. The issue of canal effects on terrestrial wildlife was raised by WGFD during scoping. The issue was evaluated and it was determined that the design of the proposed canal would not impede movements of terrestrial wildlife.

2. The agreement between the WWDC, GVID and WGFD is included in Appendix E.



Ms. Julie Hamilton
February 21, 1997
Page 2 - WER 6152

14.2

Specific comments on the draft EIS are as follows:

Section 3.6.4.1, Page 3-28, Paragraph 2: The document states this segment of the Greybull River is a Class 2 fishery. This is incorrect. This stream reach is designated as a Class 2 water by the Wyoming Department of Environmental Quality. This same reach of river is classified as a Class 4 trout fishery by the WGFD. The two classification systems are not interchangeable, and have very distinct differences in their application. **3**

Page 3-29, Paragraph 1, Sentence 1: Habitat in the lower Greybull River is degraded for cold water fisheries, as is indicated by the Class 4 trout fishery rating. However, the River does support very diverse and healthy populations of fish species other than trout. This distinction needs to be made clear in the document. **4**

Section 4.6.4.1, Page 4-42, Paragraph 3: We have not seen the current operational plans for Lower Roach Gulch Reservoir. Although the preliminary plans indicated significant annual fluctuations, we understand water levels may be more stable and higher than initially proposed. If this is correct, the significant pressures exerted on the Department by numerous anglers and angler groups (i.e. great interest in development of a new fishery), and considering the significant investment of State funds on this project, we recommend this issue be revisited prior to completion of the final EIS. We feel strongly if hydrologic modeling by the State shows storage levels at Roach Gulch Reservoir can be managed to keep levels above 20-25% of normal capacity in most years without significantly compromising the project's overall feasibility, the public should receive the benefits of additional area fishing opportunities. This recommendation does not imply a formal minimum fishery pool be required. However, if one could be provided without compromising project feasibility, along with public access to the reservoir site, the best interest of the angling public would be met. **5**

Section 5.6.4, Page 5-17, Paragraph 2, Last Sentence: We request the conditions and requirements outlined in the agreement be incorporated into the Corps of Engineers 404 permit for the project. This is the only mechanism available to ensure stated provisions will be implemented and maintained. **6**

Section 5.6.4, Pages 5-17, First Bullet: We are unclear as to which reservoir would be flushed, how the reservoir would be flushed, or how much sediment would be mobilized. We also are not clear how these actions would not cause significant aquatic impacts. **7**

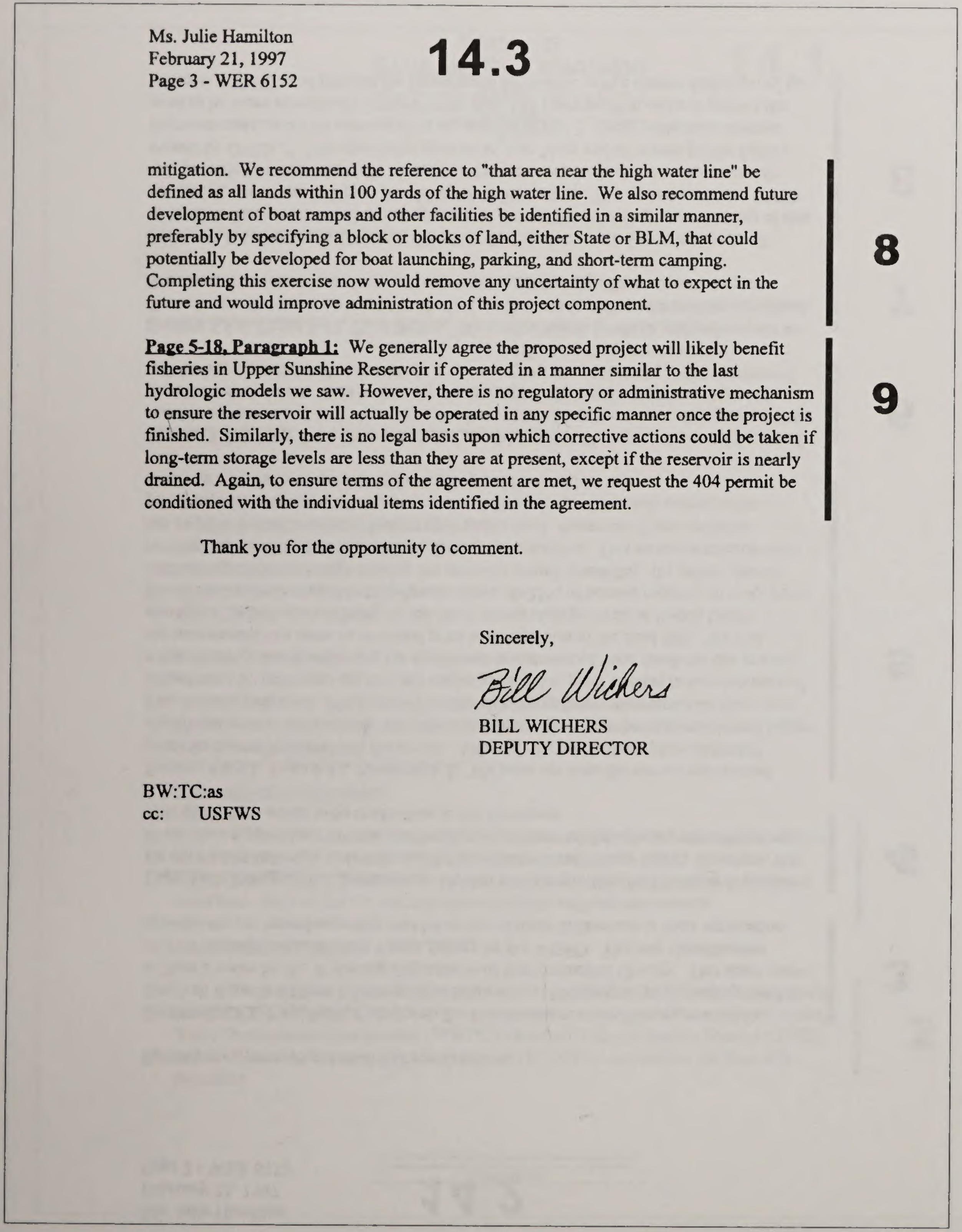
Section 5.6.4, Bullets in General. The list of mitigation items does not include all mitigation features included in the agreement. One of the most important features of this mitigation agreement is Upper Sunshine Reservoir access. The agreement states GVID will provide "Permanent public access...to that area near the high water line currently owned by GVID..." The agreement goes on to state "Any and all future public facility improvements...must be authorized in advance by GVID." These mitigation features need to be more specifically defined in the final EIS (on a map) in order to protect the interests of GVID and provide the Department and public with a clearer definition of the **8**

3. The BLM and Corps recognize the difference in the classification system and the text has been edited to correct the error (see CHAPTER 2.0 ADDITIONS AND ERRATA).

4. The DEIS reports the findings of WGFD surveys for fish (Zafft and Annear 1992). Studies by WEST (1996) found similar results as Zafft and Annear (1992). Non-game species present in this reach of the river are listed in Appendix B.

5. Analysis of the operating plan for the lower valley reservoir presented in the DEIS indicated extreme fluctuations in water level would occur on an annual basis. Figures 2-19 and 2-20 (see CHAPTER 2.0) show end-of-month storage in Lower Roach Gulch Reservoir for the period of record of the latest WEST team model. Based on the results of the modeling, it would be very difficult to keep levels above 20-25% of normal capacity. A warm water fishery was not proposed as part of the project because this is the responsibility of the WGFD and beyond the scope of the decision to be made by BLM and Corps. WGFD specifically opposed development of a warm water fishery in the lower Greybull River Valley reservoir because of reasons outlined in the DEIS (see page 4-42, 3rd paragraph). The decision to create a warm water fishery in the reservoir would be up to the State of Wyoming (WWDC and WGFD) and the GVID. Access to the site is secured as discussed under Section 4.10 RECREATIONAL RESOURCES of the DEIS (page 4-73).

6. Including provisions and conditions of the agreement between the WWDC, GVID and WGFD as a part of the 404 permit will be the responsibility of the Corps. The WGFD request is acknowledged by the Corps.



Ms. Julie Hamilton
February 21, 1997
Page 3 - WER 6152

14.3

mitigation. We recommend the reference to "that area near the high water line" be defined as all lands within 100 yards of the high water line. We also recommend future development of boat ramps and other facilities be identified in a similar manner, preferably by specifying a block or blocks of land, either State or BLM, that could potentially be developed for boat launching, parking, and short-term camping. Completing this exercise now would remove any uncertainty of what to expect in the future and would improve administration of this project component. **8**

Page 5-18, Paragraph 1: We generally agree the proposed project will likely benefit fisheries in Upper Sunshine Reservoir if operated in a manner similar to the last hydrologic models we saw. However, there is no regulatory or administrative mechanism to ensure the reservoir will actually be operated in any specific manner once the project is finished. Similarly, there is no legal basis upon which corrective actions could be taken if long-term storage levels are less than they are at present, except if the reservoir is nearly drained. Again, to ensure terms of the agreement are met, we request the 404 permit be conditioned with the individual items identified in the agreement. **9**

Thank you for the opportunity to comment.

Sincerely,

Bill Wichers

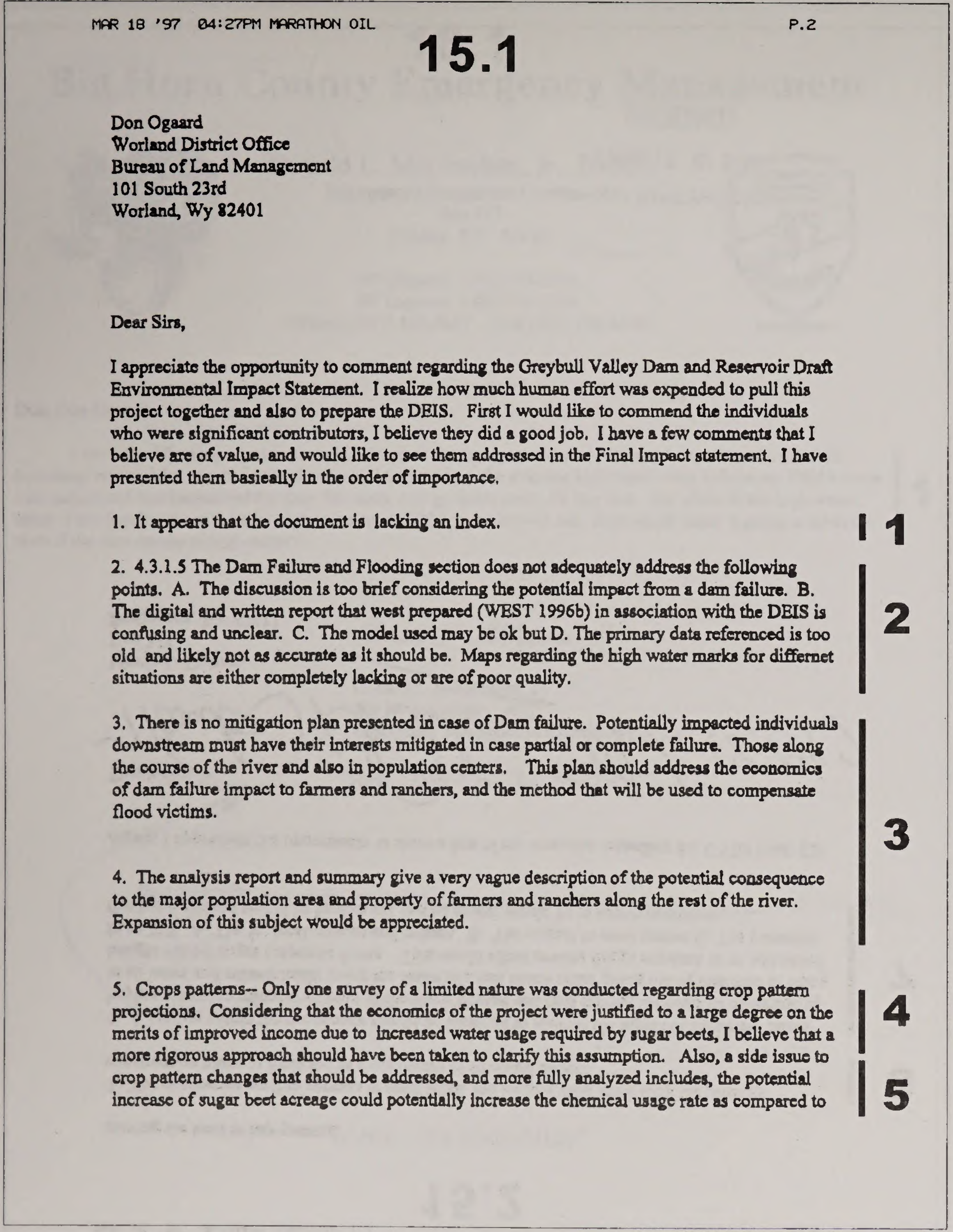
BILL WICHERS
DEPUTY DIRECTOR

BW:TC:as
cc: USFWS

7. The reservoir in question is the pool behind the diversion dam. The first bullet has been eliminated from the list for clarification (see CHAPTER 2.0 ADDITIONS AND ERRATA). During peak runoff periods, sediment loads in the river are high. Flushing the diversion dam pool during peak runoff should not significantly increase the amount of sediment in the river and should reduce the potential for sediment loads behind the diversion dam adversely affecting the river.

8. The agreement between the WWDC, GVID, and WGFD is not considered mitigation for the proposed reservoir. The project is not expected to impact water quality, therefore no mitigation is proposed for water quality. The project may result in adverse effects to fish movement in the Greybull River by blocking passage and potentially dewatering the river. Mitigation identified is for these potential impacts. Provisions identified in the agreement between WWDC, GVID, and WGFD should be addressed in the 404 permit (see response to comment 6).

9. Please see responses to comments 5 and 8 of this letter.



MAR 18 '97 04:27PM MARATHON OIL P.2

15.1

Don Ogaard
Worland District Office
Bureau of Land Management
101 South 23rd
Worland, Wy 82401

Dear Sirs,

I appreciate the opportunity to comment regarding the Greybull Valley Dam and Reservoir Draft Environmental Impact Statement. I realize how much human effort was expended to pull this project together and also to prepare the DEIS. First I would like to commend the individuals who were significant contributors, I believe they did a good job. I have a few comments that I believe are of value, and would like to see them addressed in the Final Impact statement. I have presented them basieally in the order of importance.

1. It appears that the document is lacking an index. 1

2. 4.3.1.5 The Dam Failure and Flooding section does not adequately address the following points. A. The discussion is too brief considering the potential impact from a dam failure. B. The digital and written report that west prepared (WEST 1996b) in association with the DEIS is confusing and unclear. C. The model used may be ok but D. The primary data referenced is too old and likely not as accurate as it should be. Maps regarding the high water marks for differnet situations are either completely lacking or are of poor quality. 2

3. There is no mitigation plan presented in case of Dam failure. Potentially impacted individuals downstream must have their interests mitigated in case partial or complete failure. Those along the course of the river and also in population centers. This plan should address the economics of dam failure impact to farmers and ranchers, and the method that will be used to compensate flood victims. 3

4. The analysis report and summary give a very vague description of the potential consequence to the major population area and property of farmers and ranchers along the rest of the river. Expansion of this subject would be appreciated.

5. Crops patterns-- Only one survey of a limited nature was conducted regarding crop pattern
projections. Considering that the economics of the project were justified to a large degree on the 4
merits of improved income due to increased water usage required by sugar beets, I believe that a
more rigorous approach should have been taken to clarify this assumption. Also, a side issue to
crop pattern changes that should be addressed, and more fully analyzed includes, the potential 5
increase of sugar beet acreage could potentially increase the chemical usage rate as compared to

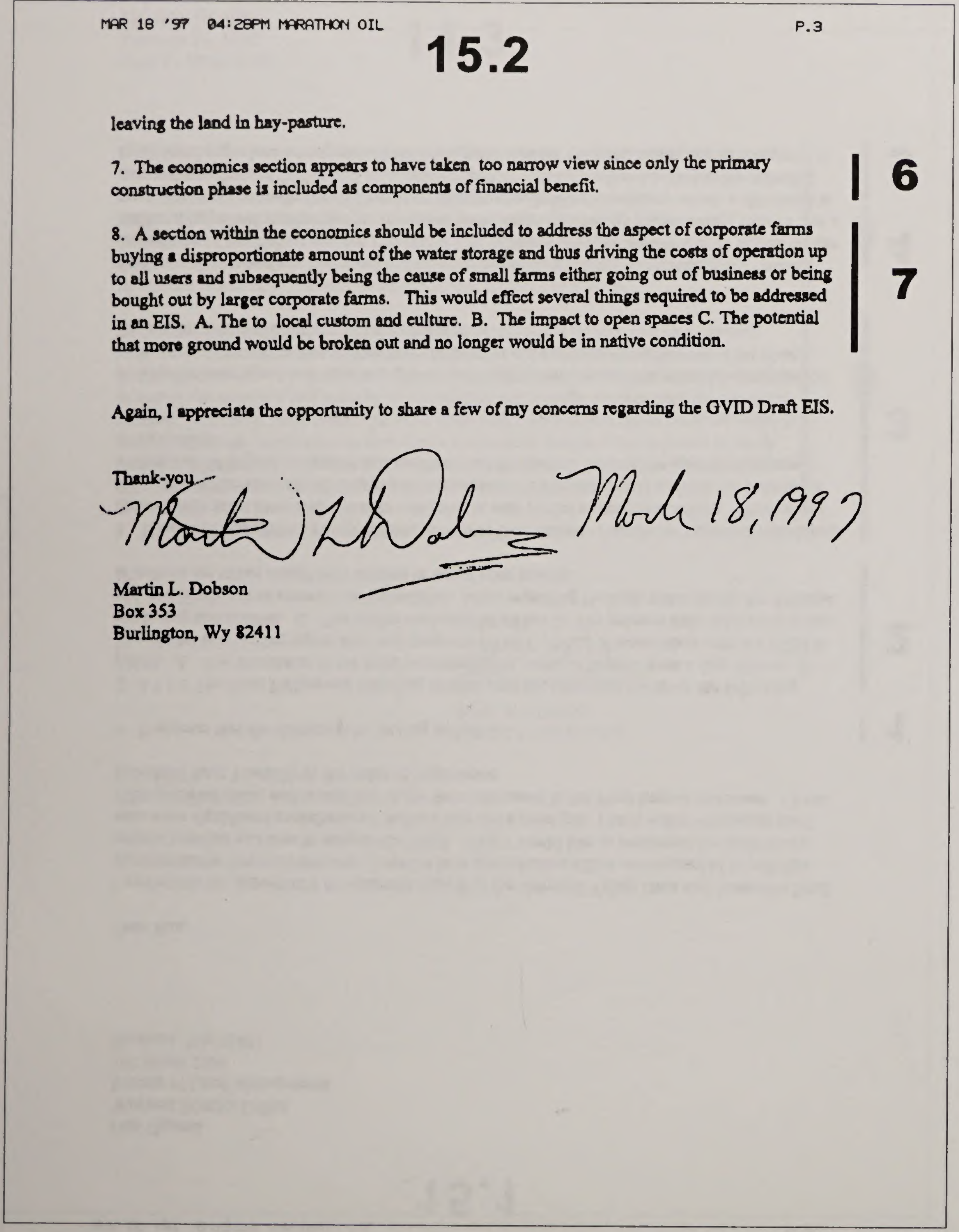
Letter 15
Martin L. Dobson - March 18, 1997

1. While an index may be helpful, the BLM and Corps typically do not provide an index to NEPA documents.

2. The dam break modeling done as part of the preparation of the DEIS consisted of what is commonly referred to as a "blue sky" dam failure. This assumes that the dam would completely breach in less than an hour while full to the normal high water line. The breach was also assumed to occur during clear weather conditions when streamflow in the Greybull River is at normal levels. This type of catastrophic failure results in the largest flood wave that would be expected in a dam failure and is an estimate of the worst case scenario for flood levels downstream of the dam. Figure 2-21 in the FEIS illustrates the predicted levels of inundation under this worst-case scenario as well as the levels of inundation predicted for current conditions by FEMA Flood Hazard Boundary Maps for the Greybull River downstream of the proposed dam.

3. An attempt to quantify losses in the event of an unlikely dam failure would be speculative and is beyond the scope and not relevant to the decision being made by BLM and Corps. Compensation for losses due to flooding from a dam break would be adjudicated in courts of law.

4. One survey of GVID irrigators was available (GEI 1994b) providing an indication of the need for additional irrigation water. Also, problems with irrigation shortages are common knowledge in the Greybull Valley. The need addressed in the EIS has been



MAR 18 '97 04:28PM MARATHON OIL P.3

15.2

leaving the land in hay-pasture.

7. The economics section appears to have taken too narrow view since only the primary construction phase is included as components of financial benefit. | 6

8. A section within the economics should be included to address the aspect of corporate farms buying a disproportionate amount of the water storage and thus driving the costs of operation up to all users and subsequently being the cause of small farms either going out of business or being bought out by larger corporate farms. This would effect several things required to be addressed in an EIS. A. The to local custom and culture. B. The impact to open spaces C. The potential that more ground would be broken out and no longer would be in native condition. | 7

Again, I appreciate the opportunity to share a few of my concerns regarding the GVID Draft EIS.

Thank-you

Martin L Dobson March 18, 1997

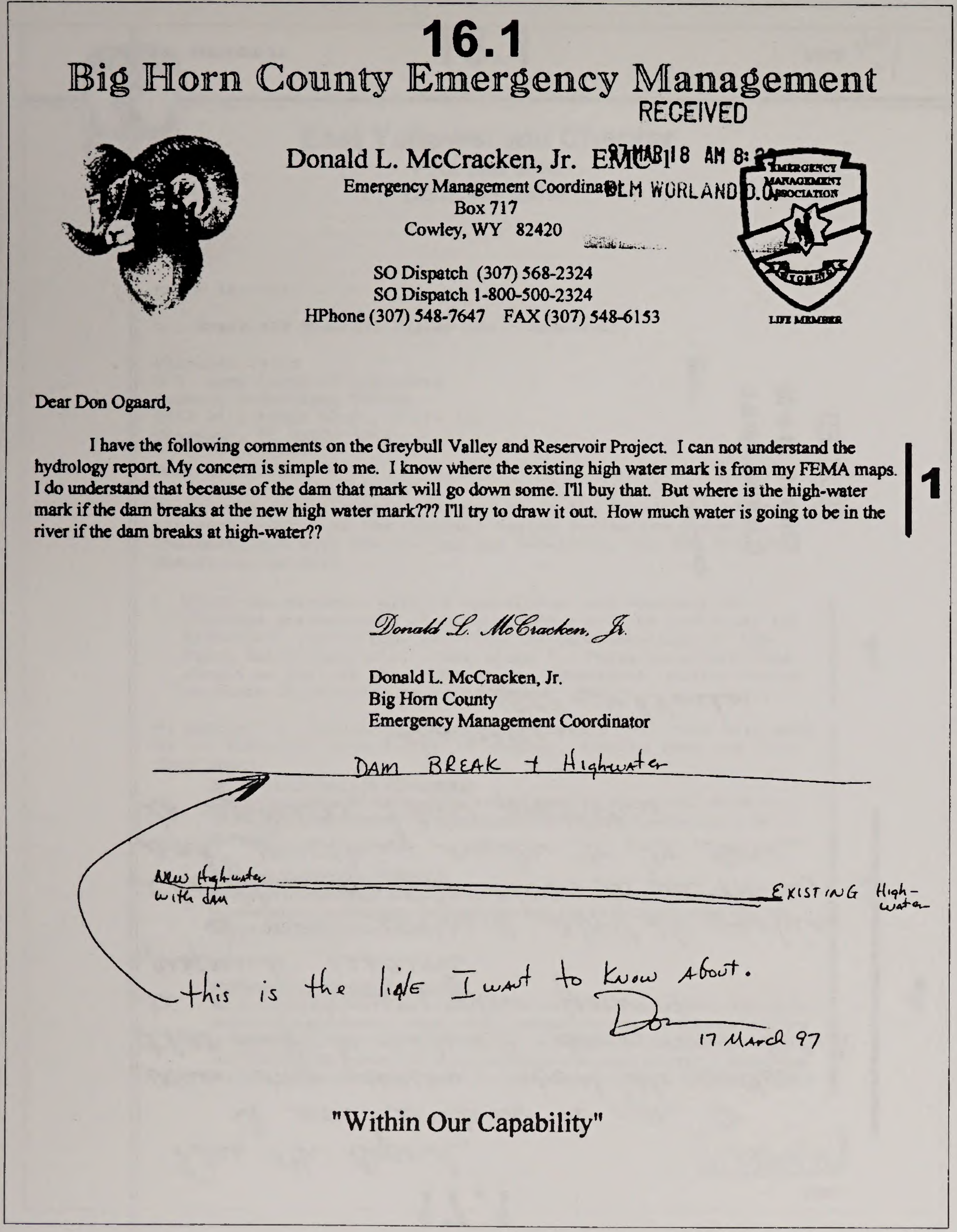
Martin L. Dobson
Box 353
Burlington, Wy 82411

further substantiated by the sale of the majority of the water shares available from the proposed project. Finally the Wyoming legislature has appropriated funds for the project.

5. Cropping patterns will likely change in the Greybull River Valley as a result of the project (see Section 4.7.1 CROPS AND CROPPING PATTERNS and Section 4.8.3 IRRIGATED AGRICULTURE). It is estimated that approximately 1,600 acres will be converted to sugar beets based on the survey of irrigators. It is likely that this increase in sugar beet production will result in increased use of fungicides, herbicides, and pesticides in the Greybull River Valley (see page 4-26, Section 4.3.2.4 Other Water Quality Concerns).

6. Economic benefits were extrapolated over a 50 year life of the project (see Sections 4.8.2 INCOME and Section 4.8.3 IRRIGATED AGRICULTURE)

7. Sale of shares is a private contract among private parties with no regulation from state or federal government. Estimating the potential for the scenario identified is speculative and beyond the scope of the EIS and decisions to be made by the BLM and Corps. The local custom and culture is agriculture based and this project is designed to benefit agriculture. Minor impacts to open spaces are anticipated with the construction of the dam and reservoir. Increased irrigation resulting from the project will not impact open spaces as only existing agricultural lands (currently or previously cropped) will receive the additional water and no new developments are anticipated as a result of the relatively small increase in agricultural production.



16.1

Big Horn County Emergency Management

Donald L. McCracken, Jr. EMC
Emergency Management Coordinator
Box 717
Cowley, WY 82420

SO Dispatch (307) 568-2324
SO Dispatch 1-800-500-2324
HPhone (307) 548-7647 FAX (307) 548-6153

RECEIVED
97 MAR 18 AM 8:2
BLM WORLAND D.O.

LIFE MEMBER

Dear Don Ogaard,

I have the following comments on the Greybull Valley and Reservoir Project. I can not understand the hydrology report. My concern is simple to me. I know where the existing high water mark is from my FEMA maps. I do understand that because of the dam that mark will go down some. I'll buy that. But where is the high-water mark if the dam breaks at the new high water mark??? I'll try to draw it out. How much water is going to be in the river if the dam breaks at high-water?? 1

Donald L. McCracken, Jr.

Donald L. McCracken, Jr.
Big Horn County
Emergency Management Coordinator

DAM BREAK + Highwater

New Highwater with dam

EXISTING High-water

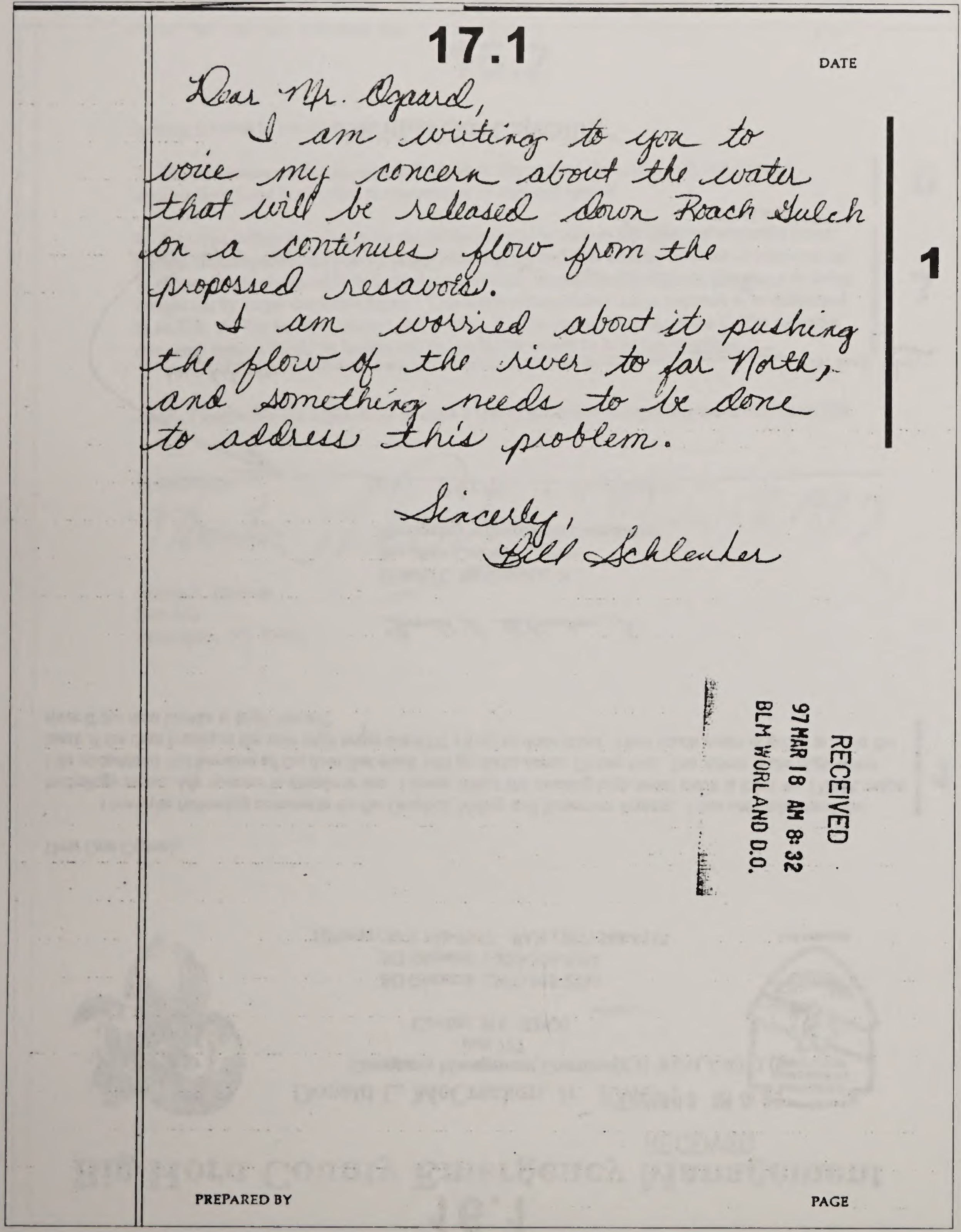
this is the line I want to know About.

Don
17 March 97

"Within Our Capability"

Letter 16
Big Horn County Emergency Management - (no date) Received March 18, 1997

1. For the purposes of the EIS, the worst case scenario should be adequate to determine potential effects of a dam failure. More detailed modeling cannot be prepared at this time because the final dam design has not been completed. The design engineers for the dam, however, are required to prepare a more detailed model of potential effects of dam failure as part of the final permitting of the reservoir. This analysis will be available for emergency planning prior to construction of the proposed dam. See also the response to comment 2 of letter 15 above.



17.1

DATE

Dear Mr. Ozard,

I am writing to you to voice my concern about the water that will be released down Roach Gulch on a continues flow from the propossed resavoir.

I am worried about it pushing the flow of the river to far North, and something needs to be done to address this problem. 1

Sincerly,

Bill Schlenker

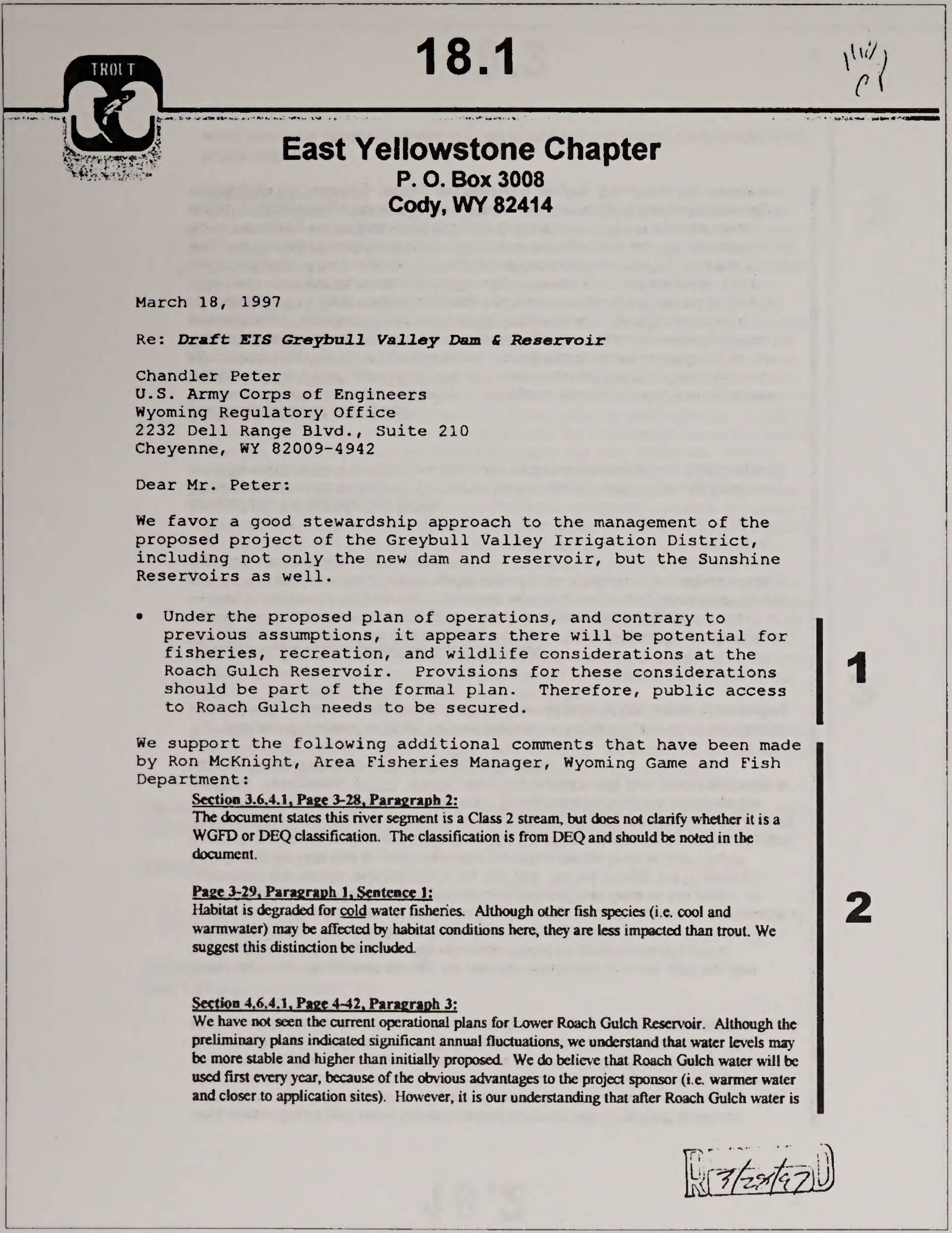
RECEIVED
97 MAR 18 AM 8:32
BLM WORLAND D.O.

PREPARED BY

PAGE

Letter 17
Bill Schlenker - (no date) Received March 18, 1997

1. The return flow channel design will incorporate measures to prevent erosion of the channel and Greybull River at the outflow. The engineering firm preparing the final design for Lower Roach Gulch Reservoir and the GVID are aware of Mr. Schlenker's concern. The final design for the outlet canal that delivers releases from the reservoir to the Greybull River includes measures to prevent erosion of the river bank opposite the discharge point as a result of canal discharges. The canal and pilot channel are designed to meet the Greybull River channel at an angle sufficient to ensure that erosional cross-currents or spiral flow will not develop downstream of the confluence. Flows in the outlet channel are routed down the main Greybull River channel rather than across the channel.



18.1

East Yellowstone Chapter
P. O. Box 3008
Cody, WY 82414

March 18, 1997

Re: ***Draft EIS Greybull Valley Dam & Reservoir***

Chandler Peter
U.S. Army Corps of Engineers
Wyoming Regulatory Office
2232 Dell Range Blvd., Suite 210
Cheyenne, WY 82009-4942

Dear Mr. Peter:

We favor a good stewardship approach to the management of the proposed project of the Greybull Valley Irrigation District, including not only the new dam and reservoir, but the Sunshine Reservoirs as well.

- Under the proposed plan of operations, and contrary to previous assumptions, it appears there will be potential for fisheries, recreation, and wildlife considerations at the Roach Gulch Reservoir. Provisions for these considerations should be part of the formal plan. Therefore, public access to Roach Gulch needs to be secured. 1

We support the following additional comments that have been made by Ron McKnight, Area Fisheries Manager, Wyoming Game and Fish Department: 2

> **Section 3.6.4.1, Page 3-28, Paragraph 2:**
> The document states this river segment is a Class 2 stream, but does not clarify whether it is a WGFD or DEQ classification. The classification is from DEQ and should be noted in the document.
>
> **Page 3-29, Paragraph 1, Sentence 1:**
> Habitat is degraded for cold water fisheries. Although other fish species (i.e. cool and warmwater) may be affected by habitat conditions here, they are less impacted than trout. We suggest this distinction be included.
>
> **Section 4,6.4.1, Page 4-42, Paragraph 3:**
> We have not seen the current operational plans for Lower Roach Gulch Reservoir. Although the preliminary plans indicated significant annual fluctuations, we understand that water levels may be more stable and higher than initially proposed. We do believe that Roach Gulch water will be used first every year, because of the obvious advantages to the project sponsor (i.e. warmer water and closer to application sites). However, it is our understanding that after Roach Gulch water is

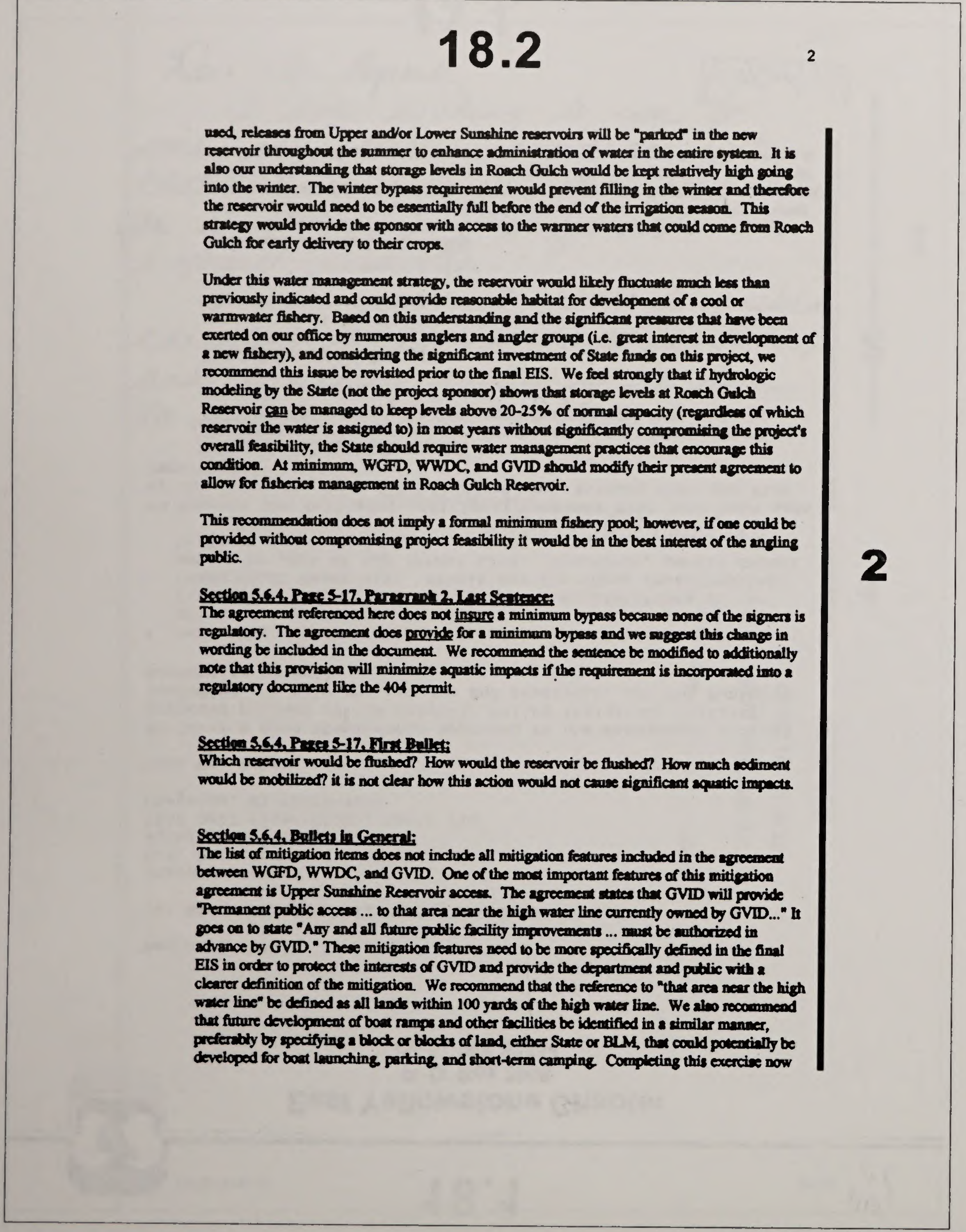
3/24/97

Letter 18
Trout Unlimited, East Yellowstone Chapter - March 18, 1997

1 This appears to be a reiteration of WGFD comments (see letter 14). The decision being considered in the EIS to build a lower Greybull River Valley reservoir does not preclude including provisions for fisheries, recreation and wildlife at the reservoir as part of the plan of operation. However, the decision to create a fishery rests with the State of Wyoming. Public access to the site for recreation is secured as discussed under Section 4.10 RECREATIONAL RESOURCES of the DEIS (page 4-73).

2 These comments appear to be the same comments found in the Wyoming Game and Fish Department letter dated February 21, 1997. Please see responses to comments from letter 14.

3 The comment solicits a Good Stewardship approach to managing the fisheries in Upper Sunshine Reservoir by avoidance of impacts. Environmental impacts reported in the DEIS were assessed based on the operating scenario in Appendix A of the DEIS. Permits for the reservoir will likely be issued for a similar operating scenario. If an operating scenario with potentially more environmental impact is desired by the applicant, the NEPA document will need to be amended to disclose resulting impacts.



18.2

2

used, releases from Upper and/or Lower Sunshine reservoirs will be "parked" in the new reservoir throughout the summer to enhance administration of water in the entire system. It is also our understanding that storage levels in Roach Gulch would be kept relatively high going into the winter. The winter bypass requirement would prevent filling in the winter and therefore the reservoir would need to be essentially full before the end of the irrigation season. This strategy would provide the sponsor with access to the warmer waters that could come from Roach Gulch for early delivery to their crops.

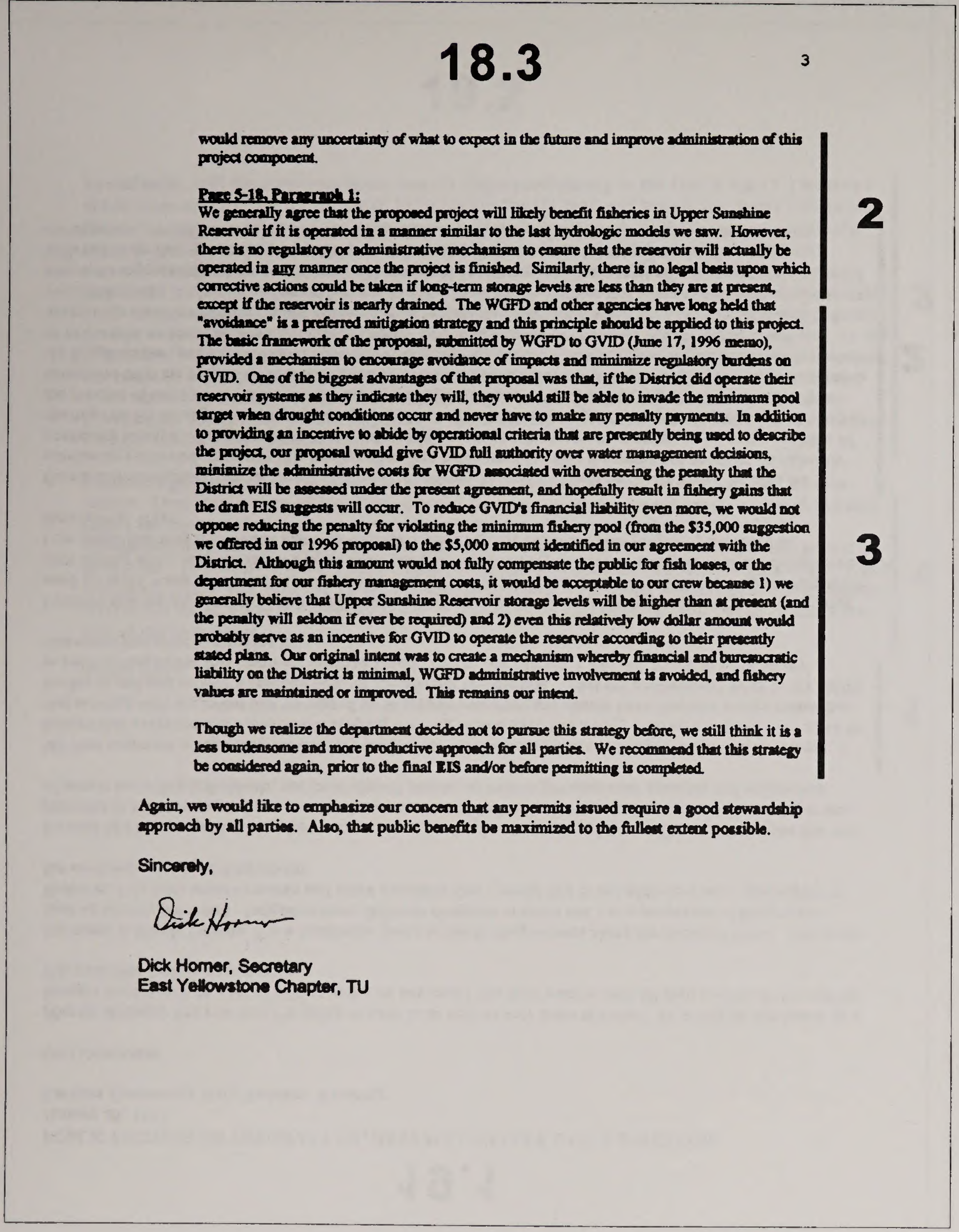
Under this water management strategy, the reservoir would likely fluctuate much less than previously indicated and could provide reasonable habitat for development of a cool or warmwater fishery. Based on this understanding and the significant pressures that have been exerted on our office by numerous anglers and angler groups (i.e. great interest in development of a new fishery), and considering the significant investment of State funds on this project, we recommend this issue be revisited prior to the final EIS. We feel strongly that if hydrologic modeling by the State (not the project sponsor) shows that storage levels at Roach Gulch Reservoir can be managed to keep levels above 20-25% of normal capacity (regardless of which reservoir the water is assigned to) in most years without significantly compromising the project's overall feasibility, the State should require water management practices that encourage this condition. At minimum, WGFD, WWDC, and GVID should modify their present agreement to allow for fisheries management in Roach Gulch Reservoir.

This recommendation does not imply a formal minimum fishery pool; however, if one could be provided without compromising project feasibility it would be in the best interest of the angling public. 2

Section 5.6.4, Page 5-17, Paragraph 2, Last Sentence:
The agreement referenced here does not insure a minimum bypass because none of the signers is regulatory. The agreement does provide for a minimum bypass and we suggest this change in wording be included in the document. We recommend the sentence be modified to additionally note that this provision will minimize aquatic impacts if the requirement is incorporated into a regulatory document like the 404 permit.

Section 5.6.4, Pages 5-17, First Bullet:
Which reservoir would be flushed? How would the reservoir be flushed? How much sediment would be mobilized? it is not clear how this action would not cause significant aquatic impacts.

Section 5.6.4, Bullets in General:
The list of mitigation items does not include all mitigation features included in the agreement between WGFD, WWDC, and GVID. One of the most important features of this mitigation agreement is Upper Sunshine Reservoir access. The agreement states that GVID will provide "Permanent public access ... to that area near the high water line currently owned by GVID..." It goes on to state "Any and all future public facility improvements ... must be authorized in advance by GVID." These mitigation features need to be more specifically defined in the final EIS in order to protect the interests of GVID and provide the department and public with a clearer definition of the mitigation. We recommend that the reference to "that area near the high water line" be defined as all lands within 100 yards of the high water line. We also recommend that future development of boat ramps and other facilities be identified in a similar manner, preferably by specifying a block or blocks of land, either State or BLM, that could potentially be developed for boat launching, parking, and short-term camping. Completing this exercise now



18.3

3

would remove any uncertainty of what to expect in the future and improve administration of this project component.

2

Page 5-18, Paragraph 1:
We generally agree that the proposed project will likely benefit fisheries in Upper Sunshine Reservoir if it is operated in a manner similar to the last hydrologic models we saw. However, there is no regulatory or administrative mechanism to ensure that the reservoir will actually be operated in any manner once the project is finished. Similarly, there is no legal basis upon which corrective actions could be taken if long-term storage levels are less than they are at present, except if the reservoir is nearly drained. The WGFD and other agencies have long held that "avoidance" is a preferred mitigation strategy and this principle should be applied to this project. The basic framework of the proposal, submitted by WGFD to GVID (June 17, 1996 memo), provided a mechanism to encourage avoidance of impacts and minimize regulatory burdens on GVID. One of the biggest advantages of that proposal was that, if the District did operate their reservoir systems as they indicate they will, they would still be able to invade the minimum pool target when drought conditions occur and never have to make any penalty payments. In addition to providing an incentive to abide by operational criteria that are presently being used to describe the project, our proposal would give GVID full authority over water management decisions, minimize the administrative costs for WGFD associated with overseeing the penalty that the District will be assessed under the present agreement, and hopefully result in fishery gains that the draft EIS suggests will occur. To reduce GVID's financial liability even more, we would not oppose reducing the penalty for violating the minimum fishery pool (from the $35,000 suggestion we offered in our 1996 proposal) to the $5,000 amount identified in our agreement with the District. Although this amount would not fully compensate the public for fish losses, or the department for our fishery management costs, it would be acceptable to our crew because 1) we generally believe that Upper Sunshine Reservoir storage levels will be higher than at present (and the penalty will seldom if ever be required) and 2) even this relatively low dollar amount would probably serve as an incentive for GVID to operate the reservoir according to their presently stated plans. Our original intent was to create a mechanism whereby financial and bureaucratic liability on the District is minimal, WGFD administrative involvement is avoided, and fishery values are maintained or improved. This remains our intent.

3

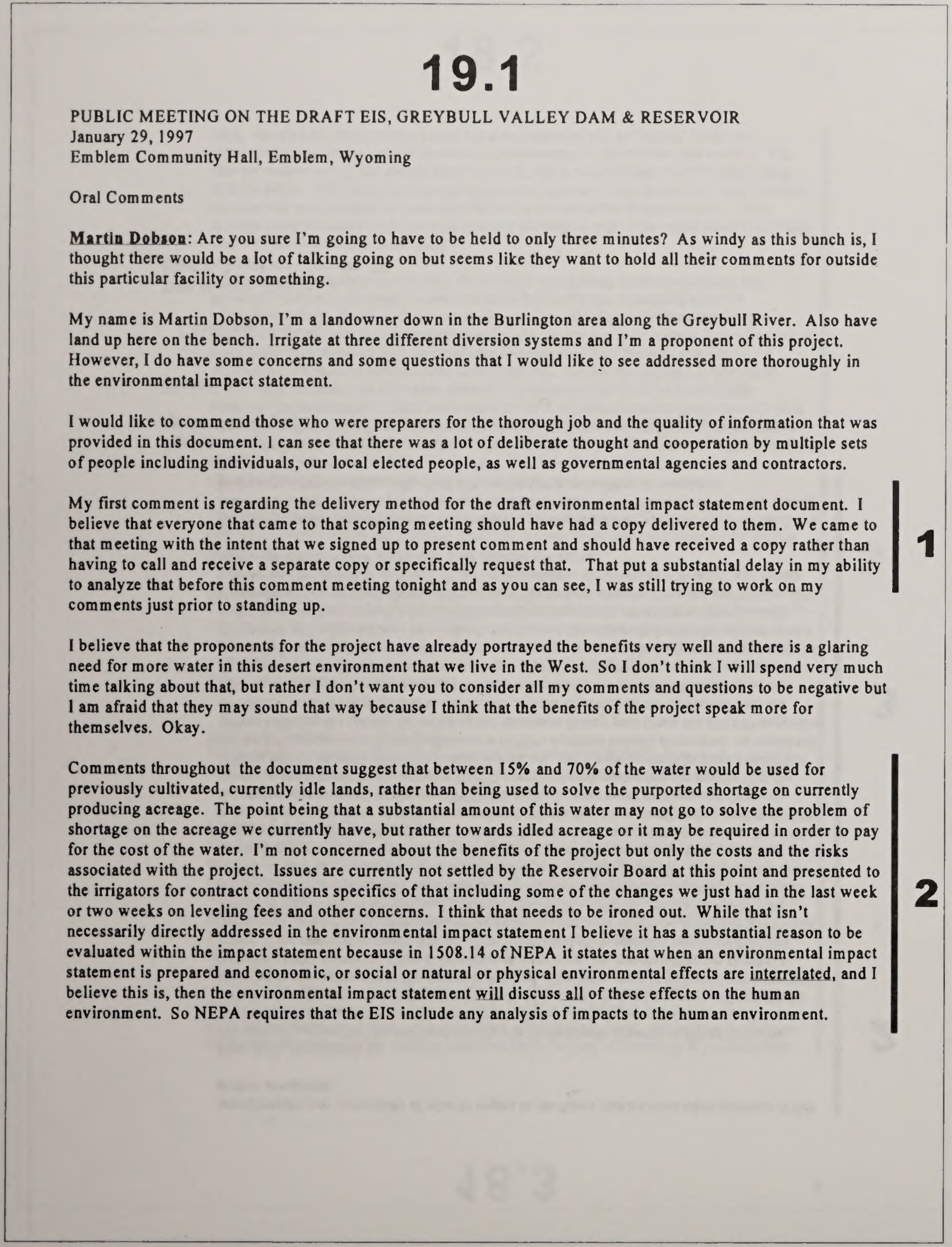
Though we realize the department decided not to pursue this strategy before, we still think it is a less burdensome and more productive approach for all parties. We recommend that this strategy be considered again, prior to the final EIS and/or before permitting is completed.

Again, we would like to emphasize our concern that any permits issued require a good stewardship approach by all parties. Also, that public benefits be maximized to the fullest extent possible.

Sincerely,

Dick Horner

Dick Horner, Secretary
East Yellowstone Chapter, TU



19.1

PUBLIC MEETING ON THE DRAFT EIS, GREYBULL VALLEY DAM & RESERVOIR
January 29, 1997
Emblem Community Hall, Emblem, Wyoming

Oral Comments

Martin Dobson: Are you sure I'm going to have to be held to only three minutes? As windy as this bunch is, I thought there would be a lot of talking going on but seems like they want to hold all their comments for outside this particular facility or something.

My name is Martin Dobson, I'm a landowner down in the Burlington area along the Greybull River. Also have land up here on the bench. Irrigate at three different diversion systems and I'm a proponent of this project. However, I do have some concerns and some questions that I would like to see addressed more thoroughly in the environmental impact statement.

I would like to commend those who were preparers for the thorough job and the quality of information that was provided in this document. I can see that there was a lot of deliberate thought and cooperation by multiple sets of people including individuals, our local elected people, as well as governmental agencies and contractors.

My first comment is regarding the delivery method for the draft environmental impact statement document. I believe that everyone that came to that scoping meeting should have had a copy delivered to them. We came to that meeting with the intent that we signed up to present comment and should have received a copy rather than having to call and receive a separate copy or specifically request that. That put a substantial delay in my ability to analyze that before this comment meeting tonight and as you can see, I was still trying to work on my comments just prior to standing up. **1**

I believe that the proponents for the project have already portrayed the benefits very well and there is a glaring need for more water in this desert environment that we live in the West. So I don't think I will spend very much time talking about that, but rather I don't want you to consider all my comments and questions to be negative but I am afraid that they may sound that way because I think that the benefits of the project speak more for themselves. Okay.

Comments throughout the document suggest that between 15% and 70% of the water would be used for previously cultivated, currently idle lands, rather than being used to solve the purported shortage on currently producing acreage. The point being that a substantial amount of this water may not go to solve the problem of shortage on the acreage we currently have, but rather towards idled acreage or it may be required in order to pay for the cost of the water. I'm not concerned about the benefits of the project but only the costs and the risks associated with the project. Issues are currently not settled by the Reservoir Board at this point and presented to the irrigators for contract conditions specifics of that including some of the changes we just had in the last week or two weeks on leveling fees and other concerns. I think that needs to be ironed out. While that isn't necessarily directly addressed in the environmental impact statement I believe it has a substantial reason to be evaluated within the impact statement because in 1508.14 of NEPA it states that when an environmental impact statement is prepared and economic, or social or natural or physical environmental effects are interrelated, and I believe this is, then the environmental impact statement will discuss all of these effects on the human environment. So NEPA requires that the EIS include any analysis of impacts to the human environment. **2**

Oral Comments
Martin Dobson - January 29, 1997

Note: Martin Dobson also sent the BLM written comments in a letter (letter 15 above). Many of the comments and concerns raised in the letter are similar to the oral comments provided. Responses to these comments are presented above for letter 15.

1. The BLM and Corps acknowledges the concern and will consider a wider distribution for future NEPA processes.

2. Please see response to comment numbers 4 and 5 of letter 15.

3 Please see response to comment number 7 of letter 15.

4. Please see response to comment number 2 of letter 15.

19.2

Specifically, will the corporate farms benefit disproportionately to the family farm? I believe I speak more specifically for the small independent family farm and how many farms will be lost due to the increase of one of the primary costs of their operation? Will this increase property taxes due to the perceived increases in property value--how much? And spread to whom? Approximately 20,000 acre/feet are needed to achieve full yield. This would be referenced in page 3-47 to full yield potential of the 33,500 acres in the farmers in the bench canal acres which I also irrigate under. What are the other alternatives, potential alternatives to achieving the same means; such as pump recycling of some of the water? Considering that most of the water, by the way I didn't see those alternatives specifically diagramed in the alternatives as I had anticipated; the range of alternatives was not as broad as it could have been. Considering that most of the water signed up for to date has been done by corporate farms and 75% of the loan is federal government tax source-- is this corporate welfare and how will it affect the little guy who is just a single family farm operator? 3

Another significant issue that I see there is one of potential flooding in terms of dam or dike failure. Don McCracken of Big Horn County Emergency Management group within the county raised the concern during the scoping of potential dam failure and what that would do to farmlands downstream. And I don't see that appear diagramed directly and explicitly within the document. I certainly want my farm, ranch, buildings and animals addressed within this EIS and mitigated. Have you satisfied all the private landowners' conditions and mitigation measures as well as the BLM's and the other Federals'? Unless I can find another page I believe that's the end of my comments. 4

Thank you.

APPENDIX E

GREYBULL VALLEY DAM AND RESERVOIR PROJECT AGREEMENT FOR FISHERIES, PUBLIC ACCESS, AND BYPASS FLOWS

GREYBULL VALLEY DAM AND RESERVOIR PROJECT

Agreement for Fisheries, Public Access, and Bypass Flows

Parties. This Agreement for Fisheries, Public Access and Bypass Flows for the Greybull Valley Dam and Reservoir Project ("Agreement") is made and entered into by and between the Greybull Valley Irrigation District ("GVID"), the Wyoming Water Development Commission ("WWDC") and the Wyoming Game and Fish Department ("WGFD").

Purpose. The purpose of this Agreement is to settle among the parties those fisheries, public access, and bypass-flow issues related to the proposed Greybull Valley Dam and Reservoir Project.

Term of Agreement. This Agreement shall commence upon execution; shall not be implemented as to specific provisions 1 through 6, inclusively, until the proposed Greybull Valley Dam and Reservoir Project is constructed and actually begins operation; and shall remain in full force and effect thereafter until terminated by the parties.

Specific Provisions. The parties hereby agree to the following specific provisions:

1. **Minimum Bypass Flows at the Proposed Greybull Valley Dam and Reservoir Diversion on the Greybull River.**

   Minimum bypass flows at the proposed Greybull Dam diversion shall be 50 cfs or inflow, whichever is less. Transfers from Upper or Lower Sunshine Reservoirs to the proposed Greybull Valley Reservoir shall not be included as a part of the inflow measurements.

2. **Public Access and Recreation at the Proposed Greybull Valley Reservoir.**

   Although public access will be provided via existing public land access at the proposed Greybull Valley Reservoir, no recreational facilities are anticipated and no fish stocking will occur due to extreme reservoir level fluctuations.

3. **Permanent Public Access at Upper Sunshine Reservoir.**

   Permanent public access will be permitted at Upper Sunshine Reservoir, to that area near the high water line currently owned by GVID and lying between the discharge of the Upper Sunshine supply canal and the Upper Sunshine caretaker's residence. Other public access at Upper Sunshine Reservoir will continue to be at the discretion of GVID. Any and all future public facility improvements, including but not limited to new roads, boat ramps, or comfort stations, must be authorized in advance by GVID.

4. **Upper Sunshine Reservoir Minimum Pool.**

GVID agrees to maintain a 5,000 acre-foot minimum pool within Upper Sunshine Reservoir, with allowances to invade the pool when GVID deems it necessary. During drought conditions, or for safety reasons, when GVID projects that invasion of the minimum pool is likely, the GVID will provide at least fifteen days notice, when practicable, to the WGFD and the WWDC.

At the commencement of operations at the proposed Greybull Valley Dam and Reservoir Project, GVID agrees to establish, through the WWDC, an interest bearing account in the amount of $15,000.00, to provide for restocking of Upper Sunshine Reservoir when the minimum pool is invaded. For each invasion of the 5,000 acre-foot minimum pool, GVID agrees to provide a payment to WGFD from the account in the amount of $5,000.00. If the account is depleted, GVID will make the required payments from other sources. MLP 7/26/96 JB 7/30/96
The Upper Sunshine minimum pool shall be deemed to have been invaded when the reservoir water line elevation is less than 6,424.24 m.s.l.

GVID agrees to utilize the Upper Sunshine Reservoir minimum pool as the reservoir of last resort when providing storage for downstream irrigation deliveries.

5. **Greybull River Bypass Flows at Wood River Confluence.**

GVID agrees to refrain from modifying its future operations in a way which would impact the existing 5 cfs bypass flows within the Greybull River located at the confluence with the Wood River.

6. **Wood River Bypass Flows at Greybull River Confluence.**

GVID agrees to refrain from modifying its future operations in a way which would impact the existing 15 cfs bypass flows within the Wood River located at the confluence with the Greybull River.

General Provisions. The parties hereby agree to the following general provisions:

1. **Amendments.**

Any party may request changes to this Agreement. Any changes, modifications, revisions, or amendments to this Agreement which are mutually agreed upon by and between the parties to this Agreement shall be incorporated by written instrument, executed and signed by all parties to this Agreement.

2. **Entirety of Agreement.**

This Agreement represents the entire and integrated agreement among the parties and supersedes all prior negotiations, representations, and agreements, whether written or oral. This Agreement shall govern relations among the parties regarding the issues addressed herein, and shall govern relations between any of the parties and any federal or state agency, or private or public organization, regarding any of the issues set out herein.

3. **Sovereign Immunity.**

The State of Wyoming, the WWDC, and the WGFD do not waive their sovereign immunity by entering into this Agreement, and each fully retains all immunities and defenses provided by law with respect to any action based on or occurring as a result of this Agreement.

DATED this 30th day of July, 1996.

Norman L. Preator
Mr. Norman Preator, Chairman
Greybull Valley Irrigation District

Mr. John Baughman, Director
Wyoming Game and Fish Department

Christine J. Allen
Attest

Brenda M Jones
Attest

Michael Purcell
Mr. Michael Purcell, Director
Wyoming Water Development Commission

S Jane Caton
Attest

APPENDIX F

TECHNICAL REPORT

PILOT STUDY TO INVESTIGATE THE POTENTIAL FOR SELENIUM ACCUMULATION IN THE GREYBULL VALLEY DAM AND RESERVOIR PROJECT

PREFACE

During the public comment period for the Greybull Valley Dam and Reservoir Draft Environmental Impact Statement (DEIS), three independent comments were received raising the concern that selenium (Se) may accumulate in the proposed reservoir and associated wetlands to levels that would be harmful to fish and wildlife. To address these concerns, a pilot study was conducted to measure Se levels in water and sediment in the area of the two reservoir alternatives and the Greybull River.

INTRODUCTION

The U.S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey (USGS), and the Wyoming State Geological Survey (WSGS) expressed concern that selenium (Se) may accumulate to harmful levels to fish and wildlife in the proposed lower Greybull River Valley reservoir. To address these concerns, a pilot study was conducted to measure Se levels in sediment and water from selected locations within the two areas considered as alternatives for siting the dam and reservoir. The objective of the study was to assess the potential for Se accumulation to levels harmful to fish and wildlife. The study was conducted using field sampling methods consistent with USGS and USFWS protocols designed to measure selenium levels in water and sediment.

METHODS

Sample locations included the Greybull River at the points of diversion for the two reservoirs and stockponds within or adjacent to the proposed reservoir sites (Table 1). The Greybull River was sampled by establishing two transects across the river (perpendicular to river flow) at the two sites. Each stockpond was divided into two strata, the area of inflow and the main body, and water and sediment were sampled independently in each strata. In addition, a third stratum was identified on the Friday the 13th Stockpond at the lower end of the pond which was available for stock watering. Two parallel transects were randomly located within each stratum of each pond.

One aliquot was analyzed from a composited sample taken from each transect for each of the parameters analyzed (Table 1): **dissolved selenium in water, total selenium in water,** and **total selenium in sediment**. The composite sample consisted of five individual scoops of sediment or five individual scoops of water equally spaced along the transect. A composite sample of water at the river locations consisted of a cross section of the river flow taken with a DH-48 sampler. This sampler is designed to collect water based on flow volume and provides a representative sample of the river water profile.

Table 1. Sample locations, number of samples, and parameters analyzed.

Location	Transect/Station	Samples	Parameters
Greybull River #1 [GR1] *Diversion for Blackstone Gulch Alternative*	Transect 1 [T1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Transect 2 [T2]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
Greybull River #2 [GR2] *Diversion for Lower Roach Gulch Alternative*	Transect 1 [T1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Transect 2 [T2]	4 water (split sample)[b]	dissolved selenium total selenium
		2 sediment (split sample)[b]	total selenium
Blackstone Gulch #1 [BG1] *Friday the 13th Stock pond*	Mainbody 1 [M1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Mainbody 2 [M2]	4 water (split sample)[b]	dissolved selenium total selenium
		2 sediment (split sample)[b]	total selenium
	Inflow 1 [I1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Inflow 2 [I2]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
Blackstone Gulch #2 [BG2] *unamed pond in area to be inundated*	Mainbody 1 [M1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Mainbody 2 [M2]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Inflow 1 [I1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium

Location	Transect/Station	Samples	Parameters
	Inflow 2 [I2]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
Blackstone Gulch #3 [BG3] *lower portion of Friday 13th Reservoir*	Mainbody 1 [M1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
Lower Roach Gulch #1[a] [LR1] *Stock pond within the east arm of reservoir*	Mainbody 1 [M1]	1 in sediment	total selenium
	Mainbody 2 [M2]	1 sediment	total selenium
	Inflow 1 [I1]	1 sediment	total selenium
	Inflow 2 [I2]	1 sediment	total selenium
Lower Roach Gulch #2 [LR2] *Stock pond at highwater line - west arm of reservoir*	Mainbody 1 [M1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Mainbody 2 [M2]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Inflow 1 [I1]	2 water	dissolved selenium total selenium
		1 sediment	total selenium
	Inflow 2 [I2]	2 water	dissolved selenium total selenium
		1 sediment	total selenium

[a] The Lower Roach Gulch Stockpond #1 was dry at the time of the sample collection. No water samples were available at this location.

[b] one sample was spilt into two samples for quality control measures

At two locations and for each matrix a split sample was taken for quality control measures (Table 1). A split sample consisted of taking one aliquot from a composite sample and splitting it into two sample containers. Each sample container was labeled independently so that the analytical lab would not know a split sample from a regular sample. Split samples were analyzed along with all other samples.

In an effort to prevent disturbed sediment or surface dust contamination of samples at the stock ponds, water was taken from the top half of the water column by submerging a capped sample bottle to the desired depth and removing the cap to allow water to flow into the bottle. This was repeated five times along a transect in the sampling location and the contents of each bottle were combined to create one composite sample. From each thoroughly mixed composite sample, one aliquot was taken for total Se analysis and one aliquot was taken for dissolved Se analysis. One ml of sulfuric acid was added to preserve each aliquot collected for analysis of total Se.

To prevent cross contamination between sites, all sample equipment was washed thoroughly with distilled water and rinsed with acetone between sample collections. At each stockpond, a new water bottle (lab cleaned) was used for collecting water samples.

Field sampling took place on May 6 and 7, 1997. All samples were kept in secure coolers on ice during sampling and shipping. All samples were shipped overnight to the analytical lab (InterMountain Laboratories, Gillette, Wyoming) on May 7, 1997. Water samples were analyzed on May 13; sediment samples were analyzed on May 15, 1997.

RESULTS

Total Se in water samples from the Blackstone Gulch stockponds ranged from 0.008 mg/L to 0.011 mg/L; no Se was detected in water from the Lower Roach Gulch stockpond #2 or the Greybull River (Table 2). No water was present in Lower Roach Gulch stockpond #1. No Se was detected in sediment samples from the stockponds at either reservoir site; total Se in sediment from the Greybull River ranged from 0.142 mg/Kg to 0.210 mg/Kg (Table 2).

DISCUSSION

According to Seiler (1995) the prominent factors affecting the concentration of contaminants associated with irrigation include: geologic sources of trace elements (on site or upstream); an arid to semiarid climate; and, topographically closed vs. open drainage basins. Seiler classified areas hydrologically by whether lakes or ponds are there that receive agricultural drain water, that are terminal during non-flood years, and that can act as wildlife habitat. The likelihood that Se contamination will occur is related to the potential for dissolved elements to become more concentrated by evaporation. If there is a source of Se, it is very probable that areas with terminal lakes and ponds in areas with very high evaporation indices will be contaminated, even though the irrigated lands do not lie on marine sediments. In the Salton Sea Area, which has a serious Se problem, there are no nearby cretaceous marine sediments, but the source water drains these kinds of sediments hundreds of kilometers upstream and contains low but detectable amounts of Se. Se from localized sources (such as volcanic rocks) can be concentrated in small isolated ponds by evaporation.

Table 2. Selenium concentrations in water and sediment samples.

	Water[a]		Sediment[b]
Sample Location	Dissolved Selenium	Total Selenium	Total Selenium
GR1-T1	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
GR1-T2	<0.005 mg/L	<0.005 mg/L	0.142 mg/Kg
GR2-T1	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
GR2-T2-1	<0.005 mg/L	<0.005 mg/L	0.201 mg/Kg
GR2-T2-2 (split)	<0.005 mg/L	<0.005 mg/L	0.210 mg/Kg
BG1-M1	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
BG1-M2-1	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
BG1-M2-2 (split)	<0.005 mg/L	0.011 mg/L	<0.100 mg/Kg
BG1-I1	<0.005 mg/L	0.008 mg/L	<0.100 mg/Kg
BG1-I2	<0.005 mg/L	0.009 mg/L	<0.100 mg/Kg
BG2-M1	<0.005 mg/L	0.009 mg/L	<0.100 mg/Kg
BG2-M2	<0.005 mg/L	0.009 mg/L	<0.100 mg/Kg
BG2-I1	<0.005 mg/L	0.008 mg/L	<0.100 mg/Kg
BG2-I2	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
BG3-M1	<0.005 mg/L	0.009 mg/L	<0.100 mg/Kg
LR1-M1	na	na	<0.100 mg/Kg
LR1-M2	na	na	<0.100 mg/Kg
LR1-I1	na	na	<0.100 mg/Kg
LR1-I2	na	na	<0.100 mg/Kg
LR2-M1	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
LR2-M2	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
LR2-I1	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg
LR2-I2	<0.005 mg/L	<0.005 mg/L	<0.100 mg/Kg

[a] detection limit is 0.005 mg/L
[b] detection limit is 0.100 mg/Kg
na- not available

Cretaceous sediments have been known to be important sources of Se since the 1930s (Seiler 1995). The Fort Union Formation, which underlies the Willwood formation by 2000-2500 feet at the proposed reservoir locations, is the only formation in the Greybull River Valley near the reservoir sites potentially a significant source of Se (Robinove and Langford 1963). The presence of Se in the Fort Union Formation is variable depending on the prevalence of shale. Ground water is the most likely avenue for selenium to migrate from the Fort Union Formation to the reservoir. The potential for ground water interchange with water in either alternative appears low. Permeability of the Willwood approached zero (0) in investigations conducted within the Lower Roach Gulch area, except in the few locations where fractures occur.

The low but detectible total selenium in water samples from Blackstone Gulch suggest that a source for selenium probably exists within the drainage basin providing runoff to these stockponds. Likewise, the drainage basin containing the pond in Lower Roach Gulch with water apparently does not have a source for selenium. However, the ponds in both gulches drained only a portion of the total potential reservoir basins and the similarities between the two basins suggest that both will have similar sources of selenium. The lack of detectable dissolved selenium in the water and total selenium in sediments may indicate that the potential for accumulation of measurable concentrations of selenium in these media is low.

A hydrologic analysis was completed for the drainage basin contributing to the Friday the 13th Stock Reservoir where selenium was found in the water samples. The reservoir was permitted in 1967 with the Wyoming State Engineer's Office and has a total capacity of 6.42 acre-feet. It is likely, however, that the reservoir was constructed much earlier and then permitted in 1967 when the BLM was obtaining permits for all stock reservoirs on BLM land statewide. All of the stock reservoirs on BLM land in the Greybull River basin were permitted between 1966 and 1971.

The drainage area of the Friday the 13th Stock Reservoir is approximately 261 acres. At the average annual runoff rate for the area of 15 acre-feet per square mile of drainage area (Lowry et al. 1993), annual runoff available for storage in the reservoir would be approximately 6.1 acre-feet. To ensure that water quality remains acceptable, stock reservoirs are generally designed with a storage capacity smaller than the expected annual total runoff. By designing with a smaller capacity than the annual runoff, the reservoir can be flushed on nearly an annual basis to prevent concentration of potentially harmful chemical constituents in the reservoir water. Since the capacity of the Friday the 13th Stock Reservoir is larger than the average annual runoff from its drainage basin, flushing of the reservoir would occur infrequently and the measured selenium concentrations probably have accumulated over a period of many years.

Concentrations of dissolved selenium, which poses the greatest risk for bio-accumulation, were below the detection limits in all samples. Concentrations of total selenium, which includes both dissolved and insoluble forms of selenium, ranged from 0.008 to 0.011 mg/L. These concentrations are approximately the same as the lowest concentrations of dissolved selenium found in water samples at the Kendrick Project in central Wyoming, where bio-accumulation is a problem (Crist 1974) and it is probable that these concentrations are the result of many years of accumulation as discussed above.

Exposed cretaceous shales are common at higher elevations within the Greybull River Valley. Sediment from these exposed shales are likely to enter the Greybull River and its tributaries. Selenium levels near or equal to the chronic aquatic life standard have been measured in the Greybull River (see Table 3.2 in the DEIS, page 3 - 12). These selenium levels may be partially due to runoff from tributaries flowing on the Willwood Formation; however, it is far more likely that the source of the Se is the Cody Shale which outcrops in the upper portion of the river basin. Cody Shale is a marine shale of Cretaceous age that has been associated with Se accumulation problems elsewhere in Wyoming (Engberg and Cappellucci 1993). It appears that the Greybull River may come into contact with sediment which carries Se (potentially Cretaceous shales) due to the presence of Se in the river sediment.

Even though sediment carried by the Greybull River contains some Se, it is unlikely that these sediments will be deposited in the reservoir alternatives. Based on the proposed operation of the project, sediment carried by the Greybull River will not accumulate behind the diversion structure but will be flushed down the river annually (see DEIS Section 5.6.4 AQUATIC RESOURCES). The diversion has been designed to maintain adequate velocities in the main channel of the Greybull River to pass most sediment through the structure. Flushing of the small amounts of sediment that may accumulate upstream of the diversion structure during high flows when natural sediment loading in the river is high was suggested by the Wyoming Department of Environmental Quality, Water Quality Division.

Water samples were collected from the river in the early stages of spring run-off. While dissolved Se was not present in these water samples, dissolved Se may be present in river water during other flow regimes. Previous sampling of water from the Greybull River found low levels of dissolved Se (see DEIS, Table 3.2, page 3-13). Sampling of water stored in the Upper and Lower Sunshine reservoirs might provide some insight into the potential for accumulation of dissolved Se in stored water from the Greybull River. However, because of the relatively low potential for Se in the off-channel reservoir sites, it is unlikely that dissolved Se would increase in concentration in Greybull River water stored at either site.

Waterborne Se in alkaline surface waters is primarily inorganic with Se VI (selenate = +6) the predominant form, although substantial amounts of Se IV (selenite = +4) may occur (Seiler 1995). Selenium levels are highest in plants in the spring when birds and other wildlife are producing young. Young are most susceptible to toxic effects (Long, et al. 1990). One of the most important factors that influence the level of Se bio-accumulation in birds is residence time in an affected area. Year-round residents are at greatest risk. Migrants or local transients are at relatively less risk (DuBowy 1989). Negative effects to reproduction in ducks occur at concentrations of 2.8 ppb Se in water and

10 ppm Se in food (Long, et al. 1990). There seems to be widespread agreement that chronic exposure to dietary concentrations >5 mg/kg (ppm) Se can produce toxic or adverse reproductive effects in some birds and mammals.

Skorupa and Ohlendorf (1991) estimated that thresholds for avian embryo toxicity occurred between 2 and 13 ug/l total recoverable waterborne Se. They used a correction factor of 1.85 to convert waterborne Se measured as dissolved Se to total recoverable Se. If waterfowl food organisms accumulated Se as sodium selenite, DuBowy (1989) estimated a criterion value of 3.9 ug/l Se in water (presumably measured as dissolved selenium). However, if Se is accumulated as selenomethionine, a more toxic and bio-available form (Hodson and Hilton 1983), it was estimated that adverse reproductive effects might occur at 2.8 ug/l waterborne Se. Lemly and Smith (1987) reported that Se concentrations greater than 2 to 5 ug/l in water may bio-accumulate in food chains and cause adverse reproductive effects in fish and aquatic birds. The assumption is that Se accumulates in wildlife foods in a general and predictable manner, and that wildlife consume only contaminated foods (Peterson and Nebeker 1992). If contaminated freshwater systems are patchily distributed over a landscape, species with large home ranges may spend considerable time foraging in uncontaminated areas.

The proposed off-channel river will provide little breeding habitat for water birds, waterfowl, amphibians and semiaquatic mammals. Operation of the reservoir will not encourage the development of perennial vegetation around its periphery and opportunities for bio-accumulation appear low. Thus, even if Se accumulates in sediments of the reservoir, the risk of exposure during the breeding season should be low. Wild ungulates and domestic livestock may use the reservoir as a source of drinking water. If dissolved Se exceeds water quality standards it is possible that these animals could be adversely affected. If a fishery is established in the reservoir, fish species could potentially accumulate Se.

CONCLUSION

While the Greybull River water may contain Se as a component in the TDS levels known to occur in the river during spring, the maximum TDS predicted for the reservoir alternatives is not likely to contain sufficient Se to result in significant accumulation in the sediments of the reservoir. Thus, the only source likely to contribute Se to either off-channel reservoir appears to be from within the basins proposed for flooding. Based on sampling conducted to date, the potential for accumulating Se in sediment appears to be low. Even if Se accumulates in the reservoir, the operational plan will decrease the likelihood of bio-accumulation in wildlife. Selenium accumulation can be a problem in closed basins where evaporation can concentrate chemical constituents of runoff originating on selenium-rich soils. One mitigation measure proposed to alleviate this condition is flushing the basins with water containing lower Se levels (Engberg and Cappellucci 1993). The operation of the proposed reservoir includes filling and emptying on a nearly annual basis. Therefore, even if soils in the reservoir basin contain Se in significant quantities, operation of the reservoir would decrease the likelihood that Se concentrations in the reservoir water would build to toxic levels. Selenium would not accumulate in a reservoir that is filled and emptied each year; and, even if total Se did accumulate to the levels found in the Friday the 13th Stock Reservoir, only a portion of the total would potentially be exposed to oxidation and become soluble in water to increase dissolved Se concentrations. If a fishery is established in the reservoir a monitoring plan should be put in place to monitor fish for accumulation of toxic levels of Se.

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APPENDIX G

ADDITIONAL SOCIOECONOMIC ANALYSES

INTRODUCTION

Several independent comments were received which raised questions about socioeconomic benefits from the project or centered around socioeconomic issues. Additionally, several comments suggested the purpose for the project was centered around additional sugar beet production in the Greybull River Valley and that the need for the project was based on filling excess capacity of sugar beet processing plants in the Big Horn Basin. One comment questioned the need for the project should sugar beet subsidies be eliminated.

In response to these comments additional socioeconomic analyses were performed. Answers to the questions raised and additional economic analyses are presented here. Topics of comments or questions received are presented in bold type. Answers and additional analyses follow each question.

Project costs by alternative

The DEIS gives total construction costs for the two alternatives as $43.2 for Lower Roach Gulch (p.4-55; p.4-62) and $47.6 million for Blackstone Gulch (p.4-63). These costs were developed by GEI Consultants, Inc. (1994b) and are expressed in 1995 dollars. They include all costs associated with final design, permitting and mitigation, legal fees, land acquisition, engineering, construction, and contingency reserves. The only additional project costs would be annual operations and maintenance (O&M) costs, estimated by GEI to be approximately $60,000 annually for each alternative. O&M costs are not considered in the DEIS. The GVID has an operations and maintenance capability associated with its existing reservoirs and supply canals, and the new reservoir would add only minor marginal costs to that existing operation (David Edwards, GVID, personal communication).

Assumptions about project life and interest rates

No explicit analysis of project life was performed. The cost analysis implicitly assumes a project life in excess of the 50 years that would be required for the GVID to repay the WWDC loan for its share of construction costs. The present value of project benefits (p.4-62) was computed using the conservative assumption of a 50-year project life and real (excluding inflationary considerations) discount rate of four percent.

Project costs

The cost figures used in the report refer to the cost of one share of reservoir storage, where one share represents a proportion of the reservoirs storage contents and a proportion of the reservoirs cost. As the number of shares sold increases, the cost per share decreases, as does the yield per share. For purposes of comparing project benefits and costs (p.4-62,4-63), it was assumed that one share represents one acre-foot of project yield. The results of the comparison would be the same, however, for other assumptions about the share-yield relationship (e.g., if 50 percent fewer shares were sold, the cost per share would double, as would the yield per share). The GVID's objective is to sell at least as many shares as the reservoirs yield, but no more than the storage contents of the reservoir (David Edwards, GVID, personal communication). In that event, the average reservoir yield per share would be one acre-foot or more.

The costs for water reported in the DEIS do not include O&M costs because the GVID believes that reservoir operations would add little to their ongoing costs of operating two reservoirs and a major canal system. If the reservoir were operated as a stand-alone facility, requiring dedicated manpower and equipment, O&M costs would be about $2.55/Acre-foot of project yield (GEI, 1994b).

Project funding and benefits

WWDC guidelines for project evaluation do not require strict adherence to national economic development efficiency guidelines, which assume that resources are fully employed at the national level and that all indirect benefits thus have offsetting costs. Instead, WWDC evaluation criteria place a heavy emphasis upon indirect and intangible project benefits. With respect to the Lower Roach Gulch alternative, total direct and indirect benefits are in excess of total project costs (page 4-62 of the DEIS).

Willingness-to-pay

While the project is expected to result in higher sugar beet production in the Greybull River Valley, that is not the only motivating factor for project sponsors. A survey of GVID members in 1991 found that the perceived benefits of the project are (in order of the percentage of respondents mentioning them) preventing crop failures with existing crops (65 percent), increasing the yields of existing crops (60 percent), and increasing the production of higher-valued crops (23 percent) (GEI, 1994a). Because the majority of GVID members do not anticipate increasing their sugar beet production, average willingness-to-pay is lower than might be the case if all project water were going to be used for that purpose.

The project would yield an average of 23,500 acre-feet of irrigation water annually. Multiplying that figure by a $20 per acre-foot willingness-to-pay estimate yields a total annual willingness-to-pay estimate of $470,000. At first it may seem unusual that irrigators would be willing to pay only $470,000 annually to avoid losses averaging $1.6 million. It should be noted, however, that even with a new reservoir, crop losses in the GVID would not be eliminated during periods of protracted drought. Also, a large portion of the $1.6 million average annual loss figure is attributable to severe drought events that have historically occurred in the Basin at 10- to 15-year intervals. During these infrequent events, all storage in existing reservoirs typically has been depleted early in the growing season, and many producers have lost a substantial portion if not all of their production of certain crops. Although the frequency of such events would be substantially reduced by a new reservoir, they would not be eliminated, nor would average annual crop damages drop to zero.

It does seem reasonable to assume that irrigators would be willing to pay more than $20 per acre-foot for water in those infrequent years when severe droughts occur, especially when many of them have invested over $500 per acre in a sugar beet crop that might be lost without finishing water. In such situations, the marginal value of irrigation water is higher than its average value in normal years. Willingness-to-pay for water under these circumstances is difficult to capture, however, with a price structure that requires equal payments for storage water each year, regardless of climatic conditions. In essence, it appears that irrigators are unwilling to pay more for irrigation water in normal years to mitigate catastrophic losses that occur only infrequently, especially when a new reservoir would not provide complete protection from an extended drought.

Project uncertainty

Project benefits were estimated under the assumption that the existing U.S. farm policy regarding sugar would remain. A change in policy could effect project benefits. The worst case scenario would be if sugar subsidies were eliminated and the crop ceased to be viable for GVID producers. A WWDC study of alternative crop production possibilities in the Big Horn Basin concluded that there is a potential for increased production of certified seed crops, potatoes, sunflowers, and vegetables (HDR 1988). Any of these crops would have the potential of delivering relatively high returns to help offset project costs.

Realistically, however, the successful introduction of new crops can take long periods of time and require the development of processing plants and markets. The Basin may also have difficulty competing with established growing areas that are located in better proximity to large markets. Thus, the relevant question is whether returns to irrigation water in the Basin from established crops would be high enough to offset project costs if sugar beet production was no longer viable.

An estimate of the economic returns to irrigated farming in the GVID in the absence of sugar beet production is given in Table 1. The information in that table was developed from the production cost and revenue estimates presented in Section 3.8.3 of the DEIS. Sugar beets were eliminated from the cropping pattern presented in the DEIS, and the production of other crops was assumed to increase in proportion to current acreage levels to make up for lost sugar beet production. The results in Table 1 indicate that returns to irrigated crop production in the absence of sugar beets would be about $135 per acre. That figure is about $30 per acre lower than the $165 per-acre figure reported in the DEIS with sugar beets in the crop mix (Table 3.9).

To convert the $135 per-acre return estimate into an estimate of irrigation water values, it is necessary to have information on crop water requirements and irrigation system efficiencies. That information is presented in Table 2. The third column of Table 2 gives the average consumptive irrigation requirement for alfalfa, dry beans, and malting barley in the Greybull Valley as reported by Pochop et al. (1992). The fourth column of the table shows consumptive irrigation requirements weighted by each crop's proportion of crop acreage. The total figure in that column shows that the three-crop mix, excluding sugar beets, would consumptively use an average of 1.653 acre-feet of irrigation water per acre each growing season.

The last two columns of Table 2 show the implied storage requirements per acre associated with two alternative assumptions about overall irrigation efficiencies. The 40 percent efficiency column shows that 4.133 acre-feet of storage would be needed to irrigate one acre of land without sugar beets in the crop rotation. This 40 percent efficiency estimate was developed by States West Water Resources Corporation during early studies of the project that are reported by GEI (1994b). This efficiency estimate was used to develop the $36 per acre-foot estimate of the direct economic value of irrigation water presented in the DEIS (p.3-53).

From Table 1 we see that net returns to irrigated farming are $135.50 per acre. If we subtract from this figure an estimated land opportunity cost of $6.70 (DEIS, p.3-53), the remaining return of $128.80 is attributable to irrigation water. Dividing this figure by a storage requirement of 4.133 acre-feet gives $31.16 per acre-foot as the estimated value of storage water in the absence of sugar beets. This estimate is enough higher than the estimated water cost of $21 per acre-foot to provide some assurance that the GVID could support the project if sugar beet subsidies were eliminated.

This assurance is even stronger when we consider other information concerning overall irrigation efficiencies in the GVID. As reported in Section 3.7.2 of the DEIS, more recent hydrologic modeling by the WEST team indicates that overall irrigation efficiencies in the GVID may be as high as 48 percent. As shown in Table 2, a 48-percent irrigation efficiency lowers storage requirements to 3.444 acre-feet per acre in the absence of sugar beets. The corresponding return to irrigation water is estimated to be $37.40 per acre-foot. This result adds further assurance that the project's financial viability would not be threatened by the elimination of sugar subsidies.

Table 1. **Estimated returns to irrigated farming in the GVID without sugar beets**

Crop	Percent	Yield/Acre[1]	Price/Unit[2]	Gross Return/Acre	Production Cost/Acre[3]	Net Returns/Acre	Composite Net Returns
Beans	33	20.2 cwt	$ 20.98	$ 423.80	$ 287.09	$ 136.27	$ 44.97
Malt barley	44	42.6 cwt	8.03	342.08	215.10	146.25	64.35
Alfalfa	23	4.2 tons	74.40	312.48	258.18	113.82	26.18
Totals	100						$ 135.50

[1] From survey of GVID members.
[2] Average of most recent five years (i.e. 1989-1993) as reported by Wyoming Agricultural Statistics Service.
[3] From enterprise budgets for the Powell area (Hewlett, et al., 1991) updated to current dollars using appropriate cost indices (USDA, 1994).
[4] Based on the average farmer in the GVID and calculated as a product of the crop percentage and net return/acre.

Table 2. **Estimated storage requirements for crops in the GVID without sugar beets**

Crop	Percent	Consumptive Irrigation Requirement (acre-feet)	Weighted CIR (acre-feet)[1]	Storage Requirement (acre-feet) 40% efficiency.	Storage Requirement (acre-feet) 48% efficiency.
Beans	33	1.392	0.459	1.148	0.956
Malt barley	44	1.308	0.576	1.440	1.200
Alfalfa	23	2.685	0.618	1.545	1.288
Totals	100		1.653	4.133	3.444

[1] Weighted by the proportion of each crop in the crop mix.

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